

HEAT OF THE SUN.

Its Source of Supply is a Puzzling Problem to Science.

Probably the most puzzling problem we have in connection with the sun is to account for its tremendous output of heat, which we are told has varied no more than a few tenths of a degree in 50,000,000 years, the period generally given by geologists for the duration of life upon the earth.

If we accept the theory most generally advanced in the past that the sun was formerly a vast nebula extending at least as far as the planet Neptune and that its heat was maintained by slow contractions, computation shows us that only 25,000,000 times the present output would be maintained from this source—that is, if its heat were supplied by contraction alone it would have lasted only half as long as life has been known to exist upon the earth.

This is plainly impossible, and though contraction undoubtedly supplies part of the solar heat, there must be some other source of supply as well. The discovery of radio-activity in recent years may have much to do with explaining this mystery.

It is interesting to consider that if the sun were composed of coal and its heat were kept up by the process of combustion more than a ton of coal would be required per square foot of surface per hour to supply the present output of heat. The sun would be entirely burned up in 5,000 years if made of coal.—New York Sun.

OUR UNPAID LABORERS.

Birds Do Great Work, Yet We Do Not Properly Protect Them.

One form of national waste which is far more serious than the American people realize is a result of the deplorable neglect to conserve bird life in this heedless and ungrateful country.

Ornithologists and other intelligent observers of nature who have made a study of the subject say with the sanction of crop experts that insects destroy one-tenth of the products of agriculture in the United States. More than 100,000 kinds of insects have been enumerated in the fields, orchards, meadows, pastures, vineyards, gardens and woods of this chief agricultural country of the world. A very large proportion of these insects are injurious to crops. Birds are the insects' worst enemies.

Nearly all birds destroy insect life. The federal department of agriculture has examined the stomachs of forty kinds of birds to determine accurately what they consume. It was found that among the birds which most effectively aid the farmers are phoebes, kingbirds, catbirds, swallows, brown thrashers, rose breasted sparrows, house wrens, vireos, native grackles, crows, orioles, warblers, shrike larks, loggerhead shrikes and meadow larks. Even the crow and the crow blackbird, which have rested under suspicion so long, do more good than harm to the farmers.—Chicago News.

The Indoor and the Outdoor Man. In the American Magazine Dean Herman Schneider says:

"The characteristics of men are so much on the surface that a keen analyst usually will uncover the correct one in the first interview. They signal the indoor and outdoor type of man. When a blizzard is beating against the house an 'indoor' man likes to hear the roar of the wind because it emphasizes the coziness of the inglenook and heightens his sense of protection. The 'outdoor' man is straightway seized by a desire to get out and fight the storm. Draw a picture of prospecting or construction work, and the second man will lean forward with tense muscles and radiant eyes. The other will draw more and more into himself, as if for shelter."

Toilet of the Tidy Ant.

No creature is more tidy than an ant, who cannot tolerate the presence of dirt on its body, says a writer in St. Nicholas. These little creatures actually use a number of real toilet articles in keeping themselves clean. A well known authority says their toilet articles consist of coarse and fine toothed combs, hair brushes, sponges, and even washes and soap. Their combs, however, are the genuine articles and differ from ours mainly in that they are fastened to their legs. The ants have no set time for their toilet operations, but clean up whenever they get soiled.

It Was Not Her Fault.

Dr. Black—I suppose, Mrs. Brown, that you have given the medicine according to directions? Mrs. Brown—Well, doctah, I done my best. You said give Pete one o' dese heah pills three times a day ontill gone, but I done run out o' pills yistaday, an' he hain't gone yet.—Christian Herald.

Quite So.

"The bride's mother has the advantage of the bridegroom's mother at the ceremony."

"How so?"

"Everybody assumes that the bride is getting a little the worst of it."—Louisville Courier-Journal.

Found Out.

"Would you like to hear a secret involving Mrs. Next Door in a dreadful scandal?"

"Yes, oh, yes; tell it to me!"

"I don't know any such secret. You certainly have a mean disposition."—Chicago Herald.

Her Ability.

"Are you able to keep your servants any length of time?"

"Let me see. I've had my husband six years."—St. Louis Post-Dispatch.

ARMORED VESSELS

How the Great Steel Plates That Protect Them Are Made.

A SEVERE TEST OF SKILL.

The Various Processes That Produce the Conflicting Properties Necessary in These Modern Projectile Resisting Warship Jackets.

Only armored warships could live in a naval battle with modern big gun projectiles in use, and hence the making of armor plate has become a science. The manufacture of armor plate has developed considerably in recent years, and in no branch of the steel industry is there greater opportunity for engineering and mechanical skill, coupled with metallurgical knowledge, than in the operations of forging and rolling, followed by the exact heat treatment essential to produce the almost conflicting properties necessary in modern armor.

The plate must be hard, glass hard, to resist penetration by heavy projectiles moving at tremendous velocities, yet tough and fibrous enough to take up the momentum without cracking or distortion. Mechanically, then, the plate must have an extremely hard surface and a fibrous backing. These requirements were attained in part by the old compound armor. Molten steel was poured on to a wrought iron plate and cooled. The slab was then reheated, forged and rolled to the required dimensions. If the operations were successfully carried out the line of demarcation was scarcely visible.

Recently a modification of this process was introduced to cheapen and render less tedious the production of armor. A layer of hard steel was poured into a cooled mold, the underside quickly setting. On the still fluid or pasty surface a thick layer of soft steel was poured. By careful manipulation the union of the surfaces was almost complete, and it was impossible to detect the break in composition on viewing the fractured section. This method of manufacture was undoubtedly an improvement on the old compound method.

The increasing size, velocity and hardness of modern armor piercing projectiles have necessitated the introduction of the modern armor. The process of manufacture essentially consists in case hardening to a depth of about two inches the surface of a homogeneous tough nickel chrome steel. Special air or self hardening nickel and more complex steels are used for lighter armor, gun shields and cast armored structures.

The steel is made in Siemens furnaces and carefully cast into ingots up to eighty tons in weight. These ingots are then slabbed under powerful hydraulic presses (18,000 tons) or rolled direct to the required dimensions, depending on the power of the mills and appliances. During the rolling operation, which lasts about an hour, the slab is reversed and inverted to attain uniformity of working, and scale is removed by wood fagots and water jets. After rolling the plate is usually quenched.

The next operation is that of case-hardening, and in this two plates are put face to face, separated by a layer of the carburizing reagent if it be solid, or if gaseous hydrocarbons be used the plates are slightly separated, to allow free passage for the hardening gases, by bricks arranged in rows. The plates are maintained at redness in a car furnace for three weeks and withdrawn after the hardening carbon has penetrated to the required depth. The plates are thus carburized and so made capable of being hardened, but they are not yet actually hard. At this stage all holes are drilled and plugged, and any bending or machining necessary is carried out.

From this point onward the treatments differ. Some makers insist on heating and quenching in oil or water to remove any coarse structure that may have been formed during the long annealing while carburizing. The next essential operation is that of hardening, and this is usually carried out in one of two ways. Either the plate is uniformly heated to the hardening temperature and quenched by a series of water jets playing on the upper surface with sufficient force to prevent the formation of steam or by a process known as "differential quenching," by which the carburized surface is heated to a temperature from which it will harden and the under side kept well below, so attaining a gradual fall in temperature from the top to the bottom. The whole plate is then immersed in water, the hotter surface alone being hardened, while the bark is toughened. Further mechanical operations can be carried out only by grinding or cutting with oxyacetylene, as the plate has now undergone the treatment conferring maximum hardness.

In resume, it will be noted that there are three distinct operations in modern methods of manufacture—the mechanical working of the plate to the required dimensions, the carburization of the surface, quenching the carburized surface to harden it. These operations call for exact manipulation, supervision and control, for the skill of the engineer and metallurgist may be put to the severest tests, not of the laboratory or the testing machine, but out in the "gray mists," when failure of a unit may imperil the safety and cohesion of the whole.—Chambers' Journal.

One that confounds good and evil is an enemy to good.—Burke.

SAVE THE TREES.

The White Pine Blister Rust and a Warning and an Appeal.

The American Forestry association has issued a warning and appeal for co-operation in fighting the disease known as the white pine blister rust that threatens the destruction of all the white pine and other five leaved pine trees in the United States.

This disease has already appeared in Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, New Jersey, Pennsylvania, Wisconsin, Minnesota and in Quebec and Ontario.

There is no known cure for it. It kills the white pines infected, and it spreads steadily. The spores or seeds are blown from diseased pines to currant and gooseberry bushes. They germinate on the leaves of these bushes. The leaves then produce millions of spores or seeds of the disease, which are blown by the wind from the bushes to the pines, and these, even those several miles distant from the nearest bushes, are infected, become diseased and die.

The white pines in New England are worth \$75,000,000, in the lake states \$90,000,000, in western states \$80,000,000 and in the national forests \$30,000,000, or a total of \$265,000,000.

Unless the ravages of the white pine blister rust are stopped these pines will be destroyed.

The American Forestry association urges people in all the regions where the disease has been discovered to destroy at once all currant and gooseberry bushes, diseased pines and others exposed to infection. This will help stop the spread of the disease.

The great forests of dead and dying chestnut in Pennsylvania, New Jersey, New York, Connecticut and Massachusetts stand today mute but convincing witnesses to the fact that such diseases must be checked, if at all, in their early stages.

The pine growth of this country is far more valuable than the chestnut ever was, and the damage the blister rust may do is accordingly greater than the injury that has been or can be wrought by the chestnut blight. But experience proves that the ravages of the blister rust can be, if taken in season, stopped much easier than the chestnut blight. In a number of places where started it has been nearly or entirely eradicated. May the pine forests of America be saved and not neglected as the chestnut until it is too late!—Tree Talk.

Musical Vibrations.

We can take the scale of vibrations, beginning with the shortest wave lengths that have been measured—the gamma rays given off by radium, which are only about one one-hundredth of a millimeter long—and ending with the longest known electromagnetic waves, 10,000 meters or more in length, and arrange them in a scale of octaves like the musical scale. In the Scientific Monthly Professor David Vance Guthrie of the Louisiana State university says they will cover just about forty-eight octaves, of which the rays that are visible to our eyes comprise but one.

Wrens Good Insect Eaters.

The wren, according to A. A. Saunders of Norwalk, Conn., is a valuable and interesting bird. It has a cheerful song, and during the summer months it sings almost incessantly. Its food is largely insects. A pair of wrens will work from daylight to dark during long June days gathering caterpillars and other harmful insects to feed their young. I have known them to visit the nest with insects on an average of three times in five minutes. The number of insects destroyed by a pair of wrens and their young in a season is enormous.—Tree Talk.

The Constitution.

The constitution is either a superior paramount law, unchangeable by ordinary means, or it is on a level with ordinary legislative acts and, like other acts, is alterable when the legislature shall be pleased to alter it. * * * Certainly all those who have framed written constitutions contemplate them as forming the fundamental and paramount law of the nation, and consequently the theory of every such government must be that an act of the legislature repugnant to the constitution is void.—Chief Justice John Marshall.

Judging a Potato.

A good potato should be firm and crisp when cut, and a thin cross section when held between the eyes and the light should show a relatively uniform distribution of starch throughout its whole area, as opposed to a large, translucent, watery central area, which denotes a lack of starch in this portion of the tuber. The even distribution of starch insures greater uniformity in cooking and in texture of the flesh when cooked.

Useful Curtain Suggestion.

The small metal office clips so handy for keeping papers pinned together will be found exceedingly useful for clipping up the curtains at night. The advantage over pins in preventing curtains from blowing out the screenless windows at night is that the clips leave no telltale holes.

The National Hymn.

"The Star-Spangled Banner" is honored as the national air not by act of congress, but by regulations of the military services, which prescribe that it shall be played at colors and retreat.

Drops of dew refresh the faded flowers; so do kind words cheer the aching heart.

RESPECT YOUR PROMISES.

Therefore Do Not Make Any Unless You Can Keep Them.

Keep your promises, so don't make any you can't fill.

Don't make any in conflict with agreements.

Neglecting the exact terms of a definite promise is often a very serious thing.

The keeping of promises in business transactions is the "sheet anchor" in the establishing of credit among one's business associates.

The world of business places great value on promises.

Not only in all business transactions, but in everyday life, the keeping of promises should be looked after with care.

Whatever you do, keep your word, for the man who breaks his promises even in little things is sure to break them in the more important ones.

It is a good plan when making a promise as to appointments to jot down in a memorandum book the man's name, so that no mistakes can be made.

It is a question of obligation that is not canceled until it is paid.

The man whose promise or word can be relied upon is the one whose influence is far-reaching in any community or in any business.

Keep your promises, so don't make any you can't fill.—New York Mail.

MANNING A CANOE.

The Bow Paddler Should Be Both Cool Headed and Skillful.

Contrary to the general notion about the relative importance of those in a canoe's manning, the bow paddler stands first. Among Indian voyagers he is the captain of the crew. His will is law.

Not arbitrarily is a captain's power vested in the bow paddler. It is the outcome of experience, and the basis of it is skill. The advantage of a canoe is this, that, being lighter in draft than any other known craft, it can be taken into very shallow water.

And just here, accompanying this advantage, lies a danger which the bow man must be able by his skill to meet. It is his business to watch for and avoid obstacles—snags, "dead leads," slightly submerged tree trunks and shoals—and the last two are sometimes very difficult to see before one is almost upon them. But a bow man must be able to see them. Much is at stake, life itself even.

Especially in certain kinds of rapid running it is his trained eye for navigable water and his skilled hand quick to guide the boat into it on which the safety of the crew depends.—Outing.

Father of the American Navy.

A native born Irishman that the members of his race are particularly proud of is Commodore John Barry, the "Father of the American Navy." He was born in Wexford, Ireland, in 1745. His father put him on a merchant ship before he was twelve years old, and at fourteen he was employed on a ship sailing from Philadelphia. He was a master of ships before he was twenty-one years old. When the Revolution began Barry was employed by congress to fit for sea the first fleet which sailed from Philadelphia. Barry commanded the Lexington, which captured the first British war vessel taken by a regular cruiser. Blockaded by a superior British fleet in the Delaware, he landed with his sailors and marines and joined Washington's army. Detroit Free Press.

Keep to Left Is French Rule.

French railways retain a curious trace of their origins. Contrary to the rule of the road, "Keep to the right," observed in the large majority of foreign countries, trains in France have always kept to the left, as in England. The pioneers of French railways were Englishmen (Sir Edward Blount was chairman of the Chemin de Fer du Nord until 1898), and nearly all the engine drivers were for many years of the same nationality. These men followed the rules of the road they had learned at home and passed them on to their French successors.—London Chronicle.

An Unlucky Showman.

Punch and Judy originated in China about 1,000 years before Christ. The Emperor Mir of the Chow dynasty was one day making a tour through the empire when an entertainer named Yen Shi was brought into his presence to amuse the ladies of his court. During the performance the puppets cast such significant glances toward the ladies that the angered emperor ordered the originator of the "puppet" play to be executed.—London Answers.

Wasting Food.

Professor A. E. Taylor of the University of Pennsylvania declares one-third of the annual food production of the United States is wasted by bad handling. He advocates food storage under interstate control as a means of checking the waste and maintaining price levels at reasonable heights.

Didn't Kill Him.

"Brown's wayward son has returned."

"Did they kill the fatted calf?"

"No. That would have been murder, and, besides, he's as skinny as a rail."

—Detroit Free Press.

Expert.

Manager—Yes, we have a vacancy in our financial department. Have you had any experience in finance?

"I'm supporting a \$10,000 wife on \$5,000 a year."—Life.

The readiest and surest way to get rid of censure is to correct ourselves.—Demosthenes.

Chicago Musical Arts Quartet



THE Chicago Musical Arts Quartet will be here the last day of Chautauqua in two concerts. For their afternoon concert they sing selections varying from classical to popular, and for their evening program they sing the opera "Martha" in costume. Carl Craven, tenor and manager of this company, has been engaged by the American Symphony Orchestra to appear as a soloist with it on a concert tour next winter.

The DeKoven Male Quartet



THE DeKoven Male Quartet will give two concerts here the first day of the Chautauqua.

The Chickasha Daily Express recently spoke of the DeKoven Quartet in this way: "If the opening number of the course given by the DeKoven Quartet to a large audience Friday evening is a fair sample of what is to follow the patrons of the course have a feast of fine things coming to them. The DeKovens are a decided success, presenting a program of pleasing variety which appeals to lovers of classic music as well as to those who are fond of light entertainment. The quartet is composed of Fred T. Johnston, first tenor; G. S. Pell, second tenor; Clifford A. Foote, first bass and reader, and W. G. Johnson, second bass. One of the magnificent numbers of the program was the solo, "The Prodigal Son," sung by the latter. As a reader Mr. Foote made a pronounced hit, while the one act play in which all of the quartet participated was a scream from start to finish."

And the paper at Palestine, Ill., had this to say and said it: "The DeKoven Quartet gave the third number of the course. It is a matter of fact that we have never seen a better satisfied audience. The feature was without doubt one of the best that have been given in this section of the country, and we doubt if there is anything in this line on the road that is better."

SPECIAL NOTICE TO CHAUTAUQUA BACKERS.

If you wish to see positive results from the Chautauqua, boost for an attendance of the whole community. The more men and women in the tent each day, the more minds will be at work along constructive lines for community betterment.

Talk the SEASON ticket and talk it hard. Every person in the community should have one. It puts the cost down low and gives us each day a full and representative audience.

THE CHAUTAUQUA COMMITTEE.