

runs, on the one hand, to the apartments above mentioned, and on the other to the bottom of a cuirassed well. A winding metallic stairway runs along the sides of this well, but is not attached thereto. This well, with sufficient opening to allow of the passage of duplicate *matériel*, forms an integral part of an iron plate framework, capped by a horizontal plate 8 inches in thickness. This plate, which normally closes the mouth of the well, is protected by the cross fire of the two disappearing turrets.

If it is desired to give access to the fort, it is only necessary to cause a hydraulic piston to act through a simple maneuver of a cock, and thus raise the internal framework, the staircase, and the plate $6\frac{1}{2}$ feet. All forwarding of material and every relief of the garrison is signaled by telegraph or telephone. The doorkeeper does not maneuver the hydraulic elevator until he has heard the password and the disappearing turret on guard has recognized the comers. Moreover, there are arranged along the tunnel a number of obstructions analogous to those that the engineers of the middle ages used to multiply in the galleries giving access to their fortified castles. Finally, the entrance to the catacombs is itself provided with a door, defended by two mitrailleuses.

The garrison is reduced to thirty or forty mechanics and specialists having in charge the manipulation of all the machinery above noted. The situation of this *personnel* is not without analogy with that of the mechanics and stokers of armored ships, who also are only able to breathe through the artificial ventilation provided. These men, however, can be very frequently relieved.

Commander Mougin's fort, as just described, with its three large two-gun cuirassed turrets, its four small turrets with two rapid-firing guns, its three obstructions, and all its internal machinery, will not exceed in cost the net sum of \$500,000. This is relatively cheap.

Upon the whole, the conception of the fort of the future presented itself long ago to the mind of professionals in the form of a relatively invulnerable armored ship run aground on the position commanding the defile or railway to be defended. Commander Mougin has certainly done a useful service in showing how such a conception can be carried out.

His solution of the problem offers the advantage that, with equal live power, that is power in artillery, it permits of reducing, in the ratio of ten to one, the effective *personnel* necessary to perform the service. All our generals deplore the fact that, in the present system, the constitution of the regular garrisons absorbs, at the hour of mobilization, several hundred men, who might keep in the field, and the presence of whom on the field of battle would be of a nature to lead to decisive results. In this new system, the absence of a few mechanics and assistants, taken from the ranks, will not perceptibly reduce the territorial regiments that are called upon to furnish them.—*La Nature*.

The Gas Meter Specter.

F. H. Carruth, on the joys of what he terms suburban life, is not confined to any locality, but his well told experience with the gas man illustrates the belief many gas users cherish:

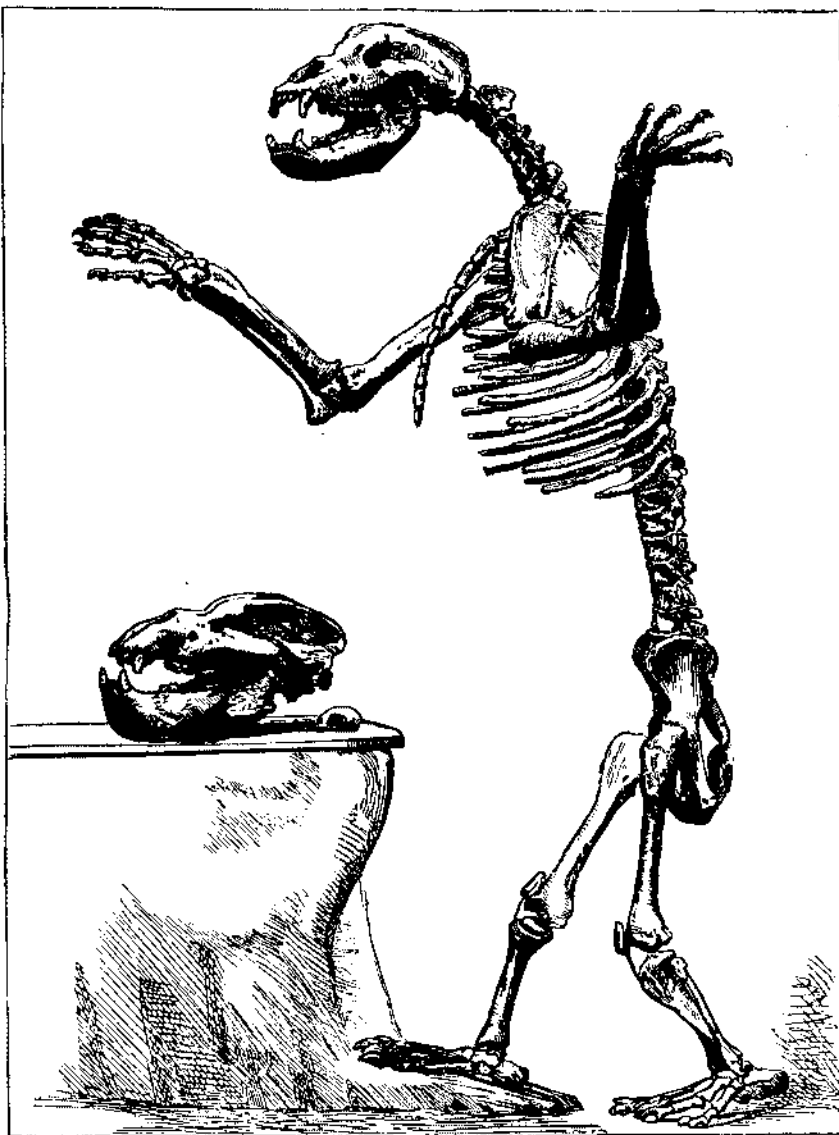
Every other day a man comes from the gas works, and after we let him in he goes down to the foot of the basement stairs and holds a secret conference with the meter. He opens a little door in it and takes a poker and stirs it up inside. Sometimes during the executive session we overhear him sort of growling away to himself, and complaining about the way the meter acts. He will explain to it that it isn't doing as well as Brown's, and that Robinson's is 'way ahead of it. Then he will punch it again with the poker, and we can hear the wheels buzzing around in it. He says meters are like other folks, liable to shirk and to 'tend to business. Then he will hit it another whack, and ask it pointedly if it wants to bankrupt the company. When he gets it running with a low, steady hum, he will shut the door and take down some figures in a blankbook, and as he comes up the stairs we will hear him saying: "Three and four and one are eleven and five is eighteen, and seven is twenty-nine, and six is forty-one, and four to carry is fifty." Then he will go around and look at our burners and dig away at them with a screwdriver and an old jackknife, and will try to sell us some new jet tips which look like old fashioned open top thimbles. He said one day that the superintendent told him that the company wasn't making nothing. I asked him how the stock was selling, and he said that he understood there wasn't any on the market just at present. He thought it had been withdrawn to be watered or something like

that. Probably they would be awful glad to get rid of it after that.

A PREHISTORIC BEAR.

Large quantities of the bones of various animals, such as the lion, hyena, bear, and prehistoric dog, have been found from time to time in caves in various parts of the world. It is probable that, as far as Europe is concerned, these caverns were more abundantly filled a few centuries ago than at present. In the prescientific era of medicine, a brisk traffic took place in these prehistoric bone deposits, as in the analogous case of Egyptian mummies. A physician of Gratz, Styria, writing in the year 1695, describes how he received many hundreds of bones and teeth, as well as four dragons' heads, and that, with these potent implements, he achieved numerous noteworthy cures. It has since been ascertained that these skulls and bones belonged to bears. The receptacle where they were found is still called "Dragons' Cave."

Our illustration represents the skeleton of a prehistoric bear (*Ursus spelæus*), as well as a second gigantic skull, which were found about four years ago in the Peggau Cave, near Gratz, Styria. The entrance to the cave is in a perpendicular rock face, some hundreds of yards in height, and the animal remains were covered with a



A PREHISTORIC BEAR.

stalactite deposit from five to ten inches thick, which had effectually preserved them from decay. Under the stalactite was a conglomerate several yards in thickness, composed of calcareous spar, quartz, and limestone. Several days were occupied in chiseling the bones out of this solid mass. A hole was made in the hinder part of the lower skull represented in our illustration, for the purpose of examining the interior. Its blunt and colossal shape differs considerably from the modern type, and indicates that this bear belonged to a very early period. The skull of an ordinary cat is given underneath in order to show the comparative size. The skull of the bear is wonderfully well preserved, the teeth are firm, and the bones bright yellow. To look at they might have been under the earth some dozen years, instead of at least twenty or twenty-five thousand. This skull is about twenty inches long and twelve inches high. The tusks are about four inches long. The skull of the skeleton is rather longer, but not quite so high. The entire skeleton is over nine feet high. The living animal was probably over ten feet.—*The Graphic*.

THE amount in the U. S. Treasury to the credit of the Patent Office fund is \$3,500,000, a sum ample, one would think, to enable the Patent Office to employ a sufficient force to keep the work of the office so well up that but little delay should occur in disposing of every application for a patent, but unfortunately some of the classes are very much in arrear with their work.

The Effects Produced by Earthquakes upon the Lower Animals.

In the last issue of the "Transactions of the Seismological Society of Japan," Professor Milne, the well-known student of volcanic phenomena, discusses the effects of earthquakes on animals. The records of most great earthquakes refer to the consternation of dogs, horses, cattle, and other domestic animals. Fish also are frequently affected. In the London earthquake of 1749, roach and other fish in a canal showed evident signs of confusion and fright; and sometimes after an earthquake fish rise to the surface dead and dying.

During the Tokio earthquake of 1880, cats inside a house ran about trying to escape, foxes barked, and horses tried to kick down the boards confining them to their stables. There can, therefore, be no doubt that animals know something unusual and terrifying is taking place. More interesting than these are the observations showing that animals are agitated just before an earthquake. Ponies have been known to prance about their stalls, pheasants to scream, and frogs to cease croaking suddenly a little time before a shock, as if aware of its coming. The Japanese say that moles show their agitation by burrowing. Geese, pigs, and dogs appear more sensitive in this respect than other animals. After the great Calabrian earthquake it is said that the neighing of a horse, the braying of an ass, or the cackle of a goose was sufficient to cause the inhabitants to fly from their houses in expectation of a shock.

Many birds are said to show their uneasiness before an earthquake by hiding their heads under their wings and behaving in an unusual manner. At the time of the Calabrian shock, little fish like sand eels (*cirricella*), which are usually buried in the sand, came to the top and were caught in multitudes. In South America certain quadrupeds, such as dogs, cats, and jerboas, are believed by the people to give warning of coming danger by their restlessness; sometimes immense flocks of sea birds fly inland before an earthquake, as if alarmed by the commencement of some sub-oceanic disturbance. Before the shock of 1885 in Chili, all the dogs are said to have escaped from the city of Talcahuano.

The explanation offered by Professor Milne of this apparent prescience is that some animals are sensitive to the small tremors which precede nearly all earthquakes. He has himself felt them some seconds before the actual earthquake came. The alarm of intelligent animals would then be the result of their own experience, which has taught them that small tremors are premonitory of movements more alarming. Signs of alarm days before an earthquake are probably accidental; but sometimes in volcanic districts gases have emanated from the ground prior to earthquakes and have poisoned animals. In one case large numbers of fish were killed in this way in the Tiber, and at Follonica on the morning of April 6, 1874, "the streets and roads were covered with dead rats and mice. In fact, it seemed as if it had rained rats. The only explanation of the phenomena was that these animals had been destroyed by emanations of carbon dioxide."

Pelicans Flying South.

Residents in the north part of the city were treated early one morning recently to a rare and interesting spectacle in the flight south of a large flock of pelicans. There were several hundred of the great birds, divided into two sections. They were quite low, and the pouch under the lower bill and throat of each could be plainly seen. The first section was over one hundred in number, flying slowly in an almost unbroken single line, and crossing the river to the Illinois side just above the upper ferry. The second division came along immediately after, but instead of at once making passage over the Mississippi, began circling, as though at a loss which way to proceed. This movement was continued fully ten minutes, when a leader suddenly started in a bee line for the southeast, the rest trailing after and soon getting out of sight.

It was said by persons familiar with the bird that it was the American white or rough billed pelican, weighing when full grown about 18 pounds. The bill is 14 inches long, and the pouch is some 7 inches deep at the widest part. During the winter the species is found along the Florida and Southern coast, but in the summer goes to the interior of the fur countries at the North, where it breeds. It was claimed the going to the South at this time presaged early cold weather.—*St. Louis Globe-Democrat*.

Sir John Lubbock on the Customs of Savage Races.

The Saturday evening, or popular, lecture to the working classes given during the recent meeting of the British Association was delivered by Sir John Lubbock, who took for his subject the "Customs of Savage Races."

After intimating that the primitive condition of man was one of savagery, and that the history of the human race on the whole had been one of progress, Sir John Lubbock said: It seems from the study of modern savages that we can gain a fairly correct idea of man as he existed in ancient times, and of the stages through which our civilization has been evolved. At the same time the study is by no means easy, because many things which seem natural and obvious to a savage appear to us absurd and inconsequential. Moreover, if we often find it far from easy to understand savages, they naturally have much greater difficulty in understanding us. All over the world nations on first seeing white men have taken them for ghosts or spirits. Our weapons, tools, animals, in fact, all our belongings, are at first a source of great wonder. An Australian tribe, for instance, when they first saw a wagon drawn by oxen, were much puzzled as to what the oxen could be. It afterward appeared that some thought they were spirits because they had spears on their heads, while others maintained that they were the wives of the white men, because they carried the burdens, which among Australians is the special duty of women. Again, the modes of salutation among savages are sometimes very curious, and their modes of showing their feelings quite unlike ours. Kissing seems to us so natural an expression of affection that we should expect to find it all over the world, yet it is unknown to the Australians, the New Zealanders, the Papuans, and the Esquimaux and other races. I mentioned this fact about the negroes in one of my books many years ago, never supposing that it would give any offense, and was surprised to receive a most violent anonymous letter from a negro of St. Domingo on the subject. He abused me in unmeasured terms, and ended by saying that he would like to drink my heart's blood.

The Polynesians and the Malays always sit down when speaking to a superior; in some parts of Central Africa it is considered respectful to turn the back to a superior. Captain Cook asserts that the inhabitants of Maliedo, an island in the Pacific Ocean, show their admiration by hissing; the Todas of the Neilgherry hills in India are said to show respect by raising the open right hand to the brow, resting the thumb on the nose; it is asserted that among the Esquimaux it is customary to pull a person's nose as a compliment; a Chinaman puts on his hat where he should take it off, and among the same curious people a coffin is regarded as a neat and appropriate present for an aged person, especially if in bad health.

Among the Yombas of West Africa, who take great care of their teeth and scrub them well at least three times a day, an old tooth brush is regarded as a touching present, not being so much intended for actual use indeed, but rather as conveying a sort of implied message that as the sender took the greatest care of his teeth and used his tooth brush continually, so his friend was also in his thoughts morning, noon, and night.

Mr. Taplin, a missionary to whom we are indebted for an excellent account of the natives of Australia, tells a curious story against himself. "When," he says, "I asked the word for sin, they gave me the one for 'thin,' and so I was led into representing that it was hateful to God for men to be thin; that they would be condemned for it. So they came to the conclusion that it was pleasing to God for people to be fat. In fact, I had been telling them that all lean people went to hell, and fat people to heaven."

Some ideas, indeed, which appear to us inexplicable and fantastic are very widely distributed. For instance, medicine; our system seems so natural; send for a doctor, get prescription, pay him, take medicine. By no means. 1. Sorcerer: evil spirits, noise. 2. Wizard: charm on board. 3. Doctor: drinks his own medicine. 4. China: pay while well.

In many parts of the world a man is strictly forbidden to speak to his mother-in-law. Again, probably every Englishman who had not studied other races would be astonished to meet with a nation in which, on the birth of a baby, the father, and not the mother, was put to bed and nursed; yet though this custom seems so ludicrous to us, it prevails very widely. In some parts of Australia, when a man marries, each of the bride's relations gives him a good blow with a stout stick, by way, I suppose, of a warm welcome into the family.

Among the Kalmucks of Central Asia, again, the marriage ceremony is very romantic. The girl is put on a horse and rides at full speed. When she has got a fair start, the lover sets off in pursuit; if he catches her she becomes his wife, but if he cannot overtake her the match is broken off, and we are assured, which I can well believe, that a Kalmuck girl is very seldom caught against her will.

This idea of capture in marriage occurs almost all over the world. Hence no doubt the custom of lifting the bride over the doorstep, which occurs, or did occur, among the Romans, the Redskins of Canada, the Chinese, the Abyssinians, and other races. Hence also perhaps our custom of the honeymoon, and hence, may be, after a wedding things are thrown, as McLellan has suggested, in mock anger after the departing bride and bridegroom.

It is remarkable how persistent are all customs and ceremonies connected with marriage. Thus our bride cake, which so invariably accompanies a wedding, may be traced back to the old Roman form of marriage by *confarreatio*, or eating together, and is found also in other parts of the world, as, for instance, among the Iroquois of North America. It must, we know, be cut by the bride, because it is the duty of the wife to prepare food for her husband. It has always seemed to me that one of the clearest proofs of the low mental power of savage men is that afforded by arithmetic. For instance, in no single Australian language is there any word for "five." They said, "One, two, two, one, two, two, many." The fingers are greatly used as a help in these simple calculations, and all over the world we find the word "hand" standing for "five" in reference to our five fingers; indeed, if we had had six we should probably have had a duodecimal notation, which would have been in many respects a great improvement on our present system. Even our own word "five" is a case in point, though it is so much worn by use that its original form is almost unrecognizable.

The original Indo-European word for "hand" is found little altered in the Persian *penze*. In Greek *penze* becomes *penze*, in German *funf*, whence our "five." The Punjab is the country of "five rivers," from *penge*, "five," and *ab*, "water," a root which we find again in many Celtic names, as, for instance, in Aberdeen, Aberystwith.

Carver astonished the Canadian Indians by allowing them to open a book wherever they pleased, and then telling them how many pages they were from the beginning. The only way they could account for this was by concluding that the book was alive, and told him whatever he asked.

We know that among many races, when a man died, his wives and slaves, sometimes, also, his horse and dog, were killed and buried with him, in order that their spirits might accompany him to the other world. But the preparation for eternity did not end here. Just as the survivors killed the wife and slaves, so they also "killed" his arms and implements, his clothes and ornaments, so that their spirits also might go with their master, and he might enter the other world as a great chief should.

The Red Indian, Mr. Sproat tells us, quite understands that the things themselves remain in the grave, but believes that the phantoms of the things accompany the spirit of the dead. Even among the Greeks we know that a coin was put in the mouth of the dead in order that he might have the wherewithal to pay the ferryman, Charon; and the Chinese are said to burn paper money with the dead—a process much to be commended from a banking point of view.

Our own sovereigns are still crowned on a stone, the Lia Fail or Stone of Destiny, which is said to have been the pillow on which the patriarch Jacob slept at Bethel when he saw "the ladder set up on the earth, and the top of it reached to heaven, and behold the angels ascending and descending on it." It was carried to Ireland, then to Iona, subsequently to Scone, and brought to England by Edward I, though some Irish antiquaries maintain that the true Lia Fail is the upright stone which stands on the hill of Tara.

We all remember the significance attached by Joseph's parents and brethren to his dreams, as well as the political importance of Pharaoh's dream, which Sir Samuel Baker has recently attempted to explain by supposing that the Abyssinians had dammed up the Atbara river. It is not an uncommon belief among savages that as a man dies so he will rise again, and that this applies to the body as well as the mind. Moreover, the way to the land of spirits was long, dangerous, and beset with demons. Many perished on the way, and no one who was not in possession of all his faculties could hope to arrive in safety. So convinced were the Fijians of this, that as soon as a man felt the least sign of old age he was anxious to start on his long journey.

Mr. Hunt tells us that one day a young man in whom he took much interest came to him and invited him to attend his mother's funeral, which was to take place the next morning. Mr. Hunt accepted the invitation and went. As he walked along in the procession he was surprised to see no corpse, and asked the young man where his mother was, when he pointed to a woman who was walking along just in front, to use Mr. Hunt's words, "as gay and lively as any of those present."

"When they arrived at the grave she took an affectionate farewell of her children and friends, and then submitted to be strangled." So general, indeed, was this custom in the islands, that in many villages there were literally no old people, all having been put

to death; and if we are shocked at the error which led to such fearful results, we may at least see much to admire in the firm faith with which they acted upon their religious belief.

Our New Navy.

The gunboat *Petrel* is being built by the Columbia Iron Works, of Baltimore, and is nearly complete in every respect. None of her machinery will be put aboard prior to launching, as it is the desire of the contractors to have as little weight as possible on the ways. The boilers and engines are all ready, and will be placed on the ship very soon after she is launched. The *Petrel* will be barkentine rig, steel hull, and of about 885 tons displacement. She will carry four guns in her main battery, besides several machine guns on deck. It is expected that the ship will be turned over to the government complete in every respect about the latter part of December.

The work on the *Chicago* still continues at the New York yard, and it is hardly probable that she will be put in commission much before the first of next year.

The double-turreted monitor *Amphitrite* was lately taken out of the dock at Wilmington, Del. Her bottom has been painted and otherwise fixed up. The department has as yet reached no decision as to whether the ship will be rebuilt at a private yard or at some navy yard.

The new cruiser *Charleston*, now building at San Francisco, Cal., will be completed about January 1, the contract time, as the department is in receipt of reports from the contractors saying that the work is progressing very rapidly, and that the ship will be turned over to the government at the time specified. Of course she will be assigned to the Pacific station, and will be the flagship.

The *Philadelphia Inquirer* says: "The *Philadelphia*, it is expected, will beat the *Baltimore* in speed, as Messrs. Cramp will supply their own engines to the former, whereas the firm of Humphreys & Tennants, England, will provide the motive power for the latter. In the one case Messrs. Cramp guarantee a speed of nineteen knots, in the other they only guarantee horse power. It will be interesting to compare the work of the two sets of engines when both vessels are in commission. The model of the *Philadelphia*, although an English design, is considered by the Messrs. Cramp to be a very good one, and capable of but little improvement in view of the work the vessel will have to perform."

"The dynamite cruiser *Vesuvius* was sent down the river October 1 to try how the engines worked. The affair was kept very quiet, only a privileged few being notified of the event. So far as could be learned, the trial was a most successful one, the vessel showing extraordinary speed, making a run of 13½ miles in 29 minutes, being an estimated speed of nearly 27 miles an hour. As the guaranteed speed is only 20 knots an hour, this, if correct, is eminently satisfactory. Allowance has, however, to be made for the tide, which would deduct about two knots off the record, but even then the result exceeds the expectations of the builders."

We learn that everything worked well on this trial. There was no heating of journals and no leaks anywhere and very little vibration. Two hundred and forty revolutions were reached without effort, but no measurements of speed were taken, as the trial was only made to find defects in the engines, if any existed. One of the builders has written to an officer of the War Department that a speed of 20 knots was obtained with a pressure of only 135 pounds. All indications point to additional speed when the full working pressure of 180 pounds is put on, and it is then expected fully 23 knots will be made.

In the naval appropriation bill approved September 7, 1888, provision was made for the construction of seven new vessels, and an appropriation of \$5,550,000 was made, and an additional appropriation of \$260,000 for a composite ship to be used as a practice vessel for the midshipmen at the Naval Academy. Secretary Whitney has now under consideration a number of designs for these new ships, and as soon as the designs are adopted, work will be immediately started on the plans and specifications, and the contracts awarded.—*Army and Navy Journal*.

An Application of the Phonograph.

R. J. Hewett, in the *Electrical World*, says: The phonograph seems to be a promising auxiliary to the Wheatstone automatic system. The phonograph can be substituted for the ink recorder, and the signals read off by a Morse operator at his leisure at lower speed. The phonograph motor would require two different speeds—a high speed for receiving the automatic telegraph signals and a slow speed for reproducing to the Morse operator. The slow speed should still further be variable within a smaller range, so as to suit the ability of the receiver. Thus the automatic and manual service would be combined, the automatic being used for transmission, while the manual service, aided by the phonograph, can be employed for receiving.