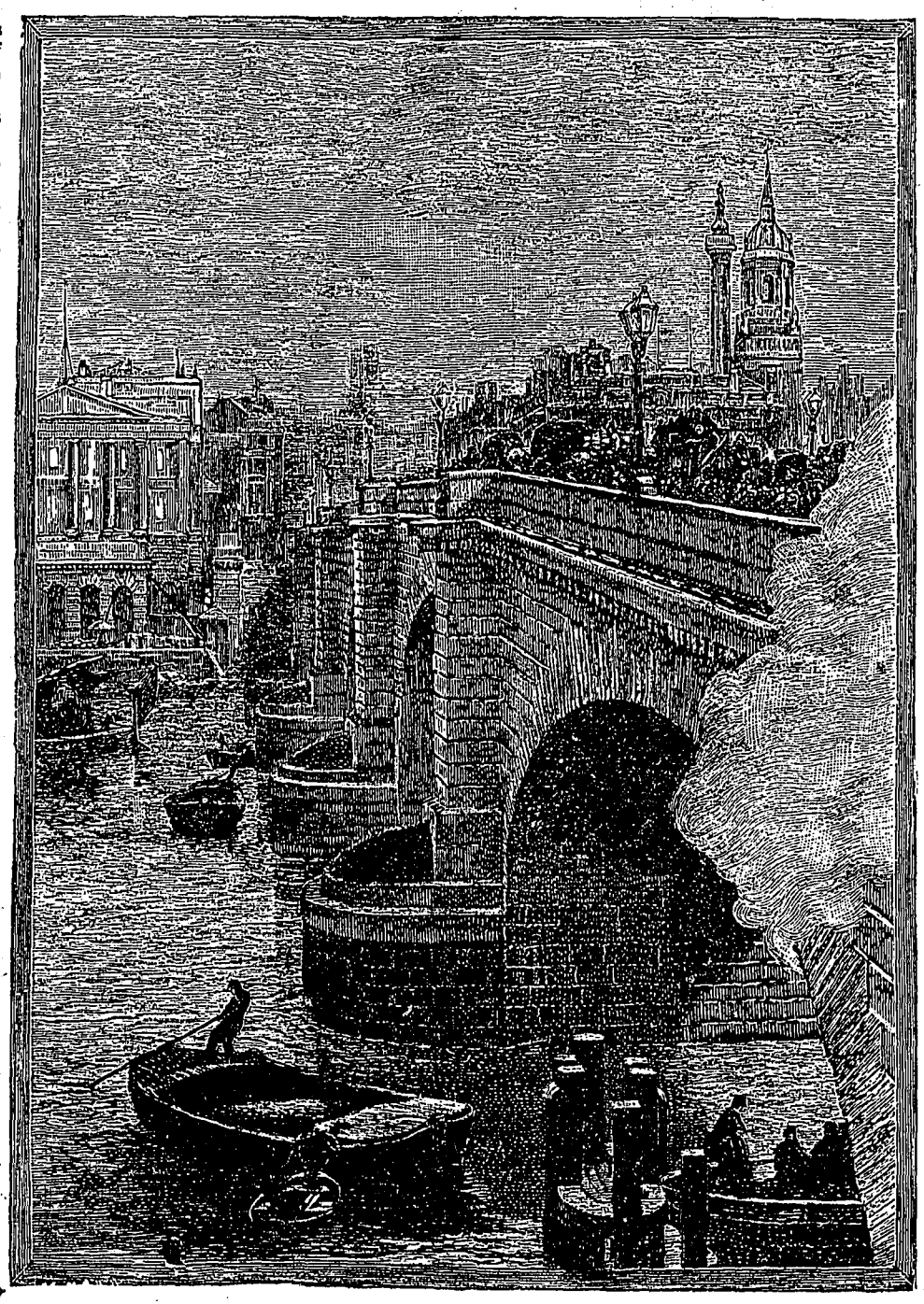
AN ANCIENT BRIDGE.

It is said that the first London Bridge over the Thames was built by the nuns of St. Mary, who lived at Southwark. This was very early in British history, for in 1008 there was a battle fought on the bridge with the Danes, who had taken possession of it. The Danes could be driven off, but there was a mightier foe to this structure. The bridge was a wooden one, and it was dashed to pieces by a violent flood. This wooden bridge was succeeded by another, of the same material, and as the first succumbed to flood so did the second to fire.

The third bridge was made of stone, as wisdom had been learned from the fate of the other two. It was built by an ecclesiastic, Peter of Colechurch, in the reign of Henry II. To raise the necessary money the King put a tax on wool, and so the people used to say that Old London Bridge was built on wool-packs. Peter of Colechurch, who is supposed to have belonged to the Brethren of the Bridge, began his work in 1176, and it was completed in 1209, during the reign of King John. There was no question about the strength of this structure. It was remarkable for its massiveness and the enormous surplus of material used in it. It had twenty arches in a span of 940 feet. The piers were from 25 to 34 feet thick, so that the piers themselves occupied two-thirds of the stream even at high water, while at low water less than one fourth of the whole span was left for waterway, and a dangerous fall was caused. There was a small town built upon the bridge, markets, bakeries, manufactories, dwelling-houses, and even a church, In the crypt of this church were buried the remains of Peter, its architect, who died while the work was in progress. It was in accordance with a custom of the Brethren of the Bridge that when any member of the society died during the superintendence of an important work, his remains should be entombed within the structure. Nearly seven hundred years after Peter's bones were found in the crypt when the work was in progress in the construction of the New London Bridge.

It is said that some of the people who lived on the bridge thought of it as quite a world in itself, and spent their whole lives there, never leaving it. The Londoners of to-day would hardly be so conservative. The great fire of London, in 1666, did much damage to the bridge, so far as the structures upon it were concerned, but it stood for nearly two hundred years more.

The New London Bridge was designed by the architect Rennie, and work was begun upon it in 1824. It is an imposing structure of granite, 928 feet in length, with five elliptical arches, in the place of the twenty of the old bridge. The centre arch has a span of 152 feet. The illustration gives some indication of the thronging traffic that surges over this structure, in the same location where for almost nine hundred years there has been a tide of life passing to and fro over the tides of the river.—*Illustrated Christian Weekly.*



LONDON BRIDGE.

THE WONDERS OF ICE.

BY CAPTAIN JAMES T. JOHNSTON, R. E.

Ice is one of our cheap luxuries, not so much in England, perhaps, as in sunnier climes, where the want of it requires to be felt, before it can be estimated at its true value; but even here, during the summer months, its use is so pleasant that we can quite understand the old duchess's feelings that, "were the drinking of iced water but a sin it would be so much more delicious." We fear there is a great deal of nonsense about some of our so-called luxuries, their sole claim to the title being their prohibitive cost. They would cease to be so considered should they at any time come within easy reach of all.

One of the greatest blessings that science has conferred upon mankind is the manufacture of artificial ice, which can now be turned out from the machine at the cost of a very few shillings per ton. It is not our intention here to describe the several methods of producing it, by radiation, evaporation, expansion, etc., nor to dwell upon its manifold benefits; but it is worthy of remark that artificial ice is purer, more transparent, harder and denser than that formed by nature. A brief outline of how ice is obtained in certain parts of Northern India during the cold weather, and stored for use against the next hot season, may interest those who have not seen or heard of it before. A large open space, proportionate to the size of the cantonment, is selected on its outskirts, covered over with the dried stems of the last season's maize, and laid out in rows with myriads of small, shallow earthenware saucers, having paths just wide enough for a man to walk between. In one corner are the storehouses, deep pits, some 40 to 50 feet in diameter, surrounded at ground level by a thick mud wall, about 6 feet high, the whole covered in with a conical roof of deep thatch.

Each evening at sunset, during the cold weather, the *bihistis* (water carriers) from every house are summoned to the ice-field by the beating of *tom-toms* (native drums beaten with the fingers), where they proceed to fill their *mashaks* (the skins in which they carry the water) from wells sunk for the purpose, and from which they fill the little saucers. Next morning, before the sun is up, a small army of coolies is assembled, by the same means as were the bihistis the evening before, to collect, in rough baskets, the ice that has formed in the saucers during the night, and to empty it into the pits, where it is rammed by others into a solid mass.

These operations continue daily, so long as the frosts last, by which time each storehouse contains one huge block of ice, several feet thick, which is then covered over with a layer of straw and several feet of earth, there to remain until required for use. The average yield is 1½ seers (3 lbs.) per head per day, for four or perhaps four or four and one-half months; but the introduction of ice-machines is fast supplanting this crude method of manufacture, which in its day has proved an inestimable boon to thousands of our fellow-countrymen whose lot has been cast in the shiny East.

We all know that water, in freezing, after reaching a certain degree of cold, viz., 40° Fahrenheit, violates the general law of contraction-by-cold, by expanding; 174 volumes of water producing 184 volumes of ice; but few, perhaps, are aware of the enormous force exerted by it, when confined, in passing from the liquid to the solid state. In order to test the greatness of this force, Huyghens filled a cannon, made of iron one inch thick, with water, and having securely closed its mouth and touch-hole, exposed it to a strong freezing draught. The water froze in about 12 hours, and expanded with such terrific force as to burst the piece. The force exerted upon this occasion was calculated to be sufficient to raise 27,720 lbs. This calls to mind a dangerous piece of construction that we have observed, particularly in barrack buildings, where the verandah of an upper story is supported by cast iron pillars, which are made to do duty also as rain-water pipes. In course of time one or more of these down-pipes gets choked, a frost sets in, the confined water freezes, the pillar bursts, down comes the verandah with a crash, and the authorities are astonished; but what else could they expect after blindly inviting such a catastrophe?

The fact of ice taking much longer to melt than it does to form, as well as that of its hardness being proportionate to the degree of cold by which it is congealed, facilitates the construction of the fairy-like ice-palaces of northern regions. "During the hard frost of 1740, a palace of ice was built at St. Petersburg after the most elegant model, and the justest proportions of Augustine architecture. It was 52 feet long, and 20 feet high. The materials were quarried from the surface of the river Neva, and the whole stood glistening against the sun with a brilliancy almost equal to its own. To increase the wonder, six cannons of ice, two bombs and mortars, all of the same material, were planted before this extraordinary edifice. The cannons were three-pounders; they were charged with gunpowder and fired off. The ball of one of them pierced an oak plank at 60 paces distant and two inches thick, nor did the piece burst with the explosion."*

There is always a certain charm about paradoxes, and ice furnishes some that appear particularly absurd. It seems, at first sight, ridiculous to be able to set fire to anything by means of a piece of ice, but this has been done, and can be done again by any child. One very clear day, a gentleman near Wentworth procured a circular piece of ice, 2 ft. 9 in. in diameter, and 5 in. thick, which he reduced to the form of a lens; and having, about noon, exposed it to the sun, the rays transmitted through it converged to a focus at seven feet distance, and fired gunpowder, paper, linen, and other combustibles.

Quite as impossible does the converse read, viz., to make ice with the aid of fire; yet this is equally true and equally easy of accomplishment. We have only to fill a pewter pot with water, and place a plate of similar alloy filled with snow on the top of it, then to bring this simple apparatus near the fire, and stir the snow with a piece of stick or other instrument. As the snow dissolves, ice will form upon the under side of the plate. Mixing a little salt with the snow will render the result more apparent, which reminds us of still another paradox, namely, that we can melt ice by increasing the degree of its coldness. To prove this, mix sal-ammoniac with snow or pounded ice, which will at once convert them into water; and if we now place a thermometer in the mixture we shall find that their cold has been increased to a surprising degree. Any salt-alum, nitre, or common salt will do the same, but in their case the cold produced will not be so intense.

A pretty experiment is to melt the interior of a lump of ice without in any way affecting its exterior, by bringing the rays of the sun, through a burning glass, to a focus in its centre. In melting, the centre will contract, and become a drop of water in an envelope of air, and will puzzle many, like the fly in the amber, or the milk in the cocoa-nut.

The following account of a natural ice-house discovered in Burgundy about the middle of the last century, from the History of the Royal Academy of Sciences at Paris, is interesting:—"It is a great cavern hollowed in a mountain, which is covered with oak and other large trees; the entrance resembles the gate of a city; the arch is raised very high; one can see clearly in all parts of it, and the interior is a spacious saloon, covered with a kind of vaulted roof upwards of sixty feet high, the flooring of crystal. There is often ice in it to the depth of four feet, and some great pieces besides, which hang from the vault in the form of festoons. The people are busy all day long carrying away the ice in waggons and on mules to all parts of the province, and yet the store is never exhausted; for one day in the midst of summer produces more than can be carried off in eight days. This prodigious quantity of ice is formed out of a rivulet that flows in a part of the grotto, which runs in winter, but is frozen in summer, and all the winter through the cave is filled with thick vapors."

*M. de Mairon. "Dissert. sur la Glace," Part II., sect. 3. chap. 3.

TRIFLES.

The massive gates of Circumstance
Are turned upon the smallest hinge,
And thus some seeming pettiest chance,
Oft gives our life its after tinge,
The trifles of our daily lives,
The common things scarce worth recall,
Whereof no visible trace survives,
These are the mainsprings, after all.