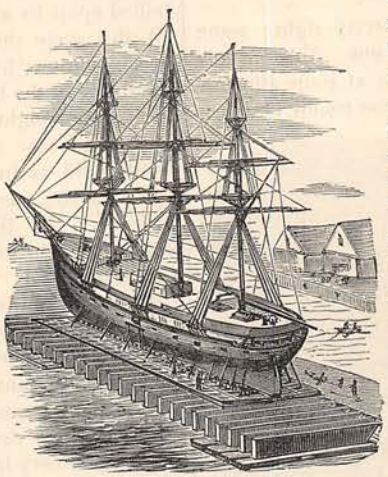
THE GATHERER.

England's "Sweet Tooth."

The sugar harvest is now almost as important to the world as the crop of corn; it is so common an article and so cheap in our own day, that we forget how straitened our forefathers were for this apparently simple thing. They were driven to use a great deal of honey in its stead. Yet, even when remembering the barrels and barrels at the grocers', it hardly seems possible that no less than 800,000,000 lbs. of sugar have been imported into England in one year—equal to 400,000 tons! This gives 31 lbs. as consumed annually by every single person. Although sugar is made in Canada from the juice of the maple-tree, and on the Continent from beet-root (the experiment of making it from beet-root has, we believe, been tried in England), by far the largest quantity is extracted from the sugar-cane. The canes are cut close to the ground, for there the stem contains the most juice, and having been made into bundles something like fagots, they are carried by mules to the mill, where the canes are passed between three rollers, and the juice is crushed out. One hundred gallons of this juice yield a little more than 100 lbs. weight of raw sugar. To make a hogshead of raw sugar requires 1,800 gallons of juice, but it has still to go through a variety of processes before emerging in the shape of the well-known conical white loaf. When it has assumed a roughly conical form it is smoothed and pointed by a machine somewhat resembling an exaggerated pencil-cutter, and the larger end is cut off. Another machine cleans the loaf with a revolving brush like an extinguisher, through which water is forced. Altogether the amount of labour, and the variety of operations that the raw material has to undergo, are surprising, considering how cheaply it is sold. An acre of this crop yields from twenty to thirty tons of cane. In 1736 only 2,500,000 lbs. of sugar were imported into the whole of Europe, but in 1867 the world's sugar harvest was computed at 7,500,000,000 lbs.! so enormously has this crop risen in importance. It is very curious to compare the taste for sugar in different countries, as indicated by the consumption per head: England comes first of all with 31 lbs.; Denmark next, 13¾ lbs.; France and Switzerland, each 9½ lbs.; the Netherlands, 9 lbs.; Germany, 8 lbs.; 3 lbs. in Austria; and only 2 lbs. in Turkey, Russia, Greece, and Spain respectively. These figures show that as a nation we have decidedly a very "sweet tooth," much sweeter than the French, though theirs is the land of bonbons.



Lifting Ships out of Water.

A ship is said to float upon the surface, but as a matter of fact the largest part of a vessel is really under water; as much as two-thirds, or even more, being as it were sunk and out of sight. This is what is meant by a ship drawing twenty feet. The keel is as deep below the surface as the roof of a cottage is above the level of the ground. All this portion is in consequence quite out of reach, and when a leak takes place, or any damage is sustained, before it can be repaired either the water must be drawn away from the vessel, or the vessel must be hoisted bodily above and out of the water, so that the carpenters or smiths may work. At great sea-ports, as London, docks have been constructed which utilise the rise and fall of the tide for this purpose: the damaged ship enters the dock at full tide, and when the ebb occurs the water is shut out by gates, leaving her high and dry. But it often happens that ships require repair when many thousand miles from great sea-ports, at places where it would be difficult to make such docks, the tides not rising high enough, and where the immense expense attending their construction is an insuperable obstacle. To meet these cases the floating dock exhibited in our engraving has been invented, which literally lifts the ship right out of water. It is in effect an ingenious raft, which can be made to float or sink at pleasure. The floor of the raft is hollow, and water can be pumped in or out of this part. The upright portion against which the vessel in the cut seems to lean is also hollow and contains air, the buoyancy of which is just sufficient to float the raft itself without any load. All the lifting power is under the keel, and the side compartment is chiefly useful in keeping the ship upright. When water is pumped into the bottom of the raft it sinks below the surface to the depth required, the vessel is placed precisely above it, the water pumped out, and the raft rises, carrying the ship with it. From the floating dock she can then be transferred to the "gridiron," which is simply a strong platform where she is propped upright, and where workmen can repair her at their ease. Something of the same principle is employed in one class of ironclads; when going into action water is let into certain compartments, and its weight sinks the deck almost flush or level with the sea, so as to afford little for the enemy to aim at. When the fight is over the water can be pumped out, and the deck rises to its original height above the surface. Upon this buoyant raft, or floating dock, ships can be taken into very shallow water, where they

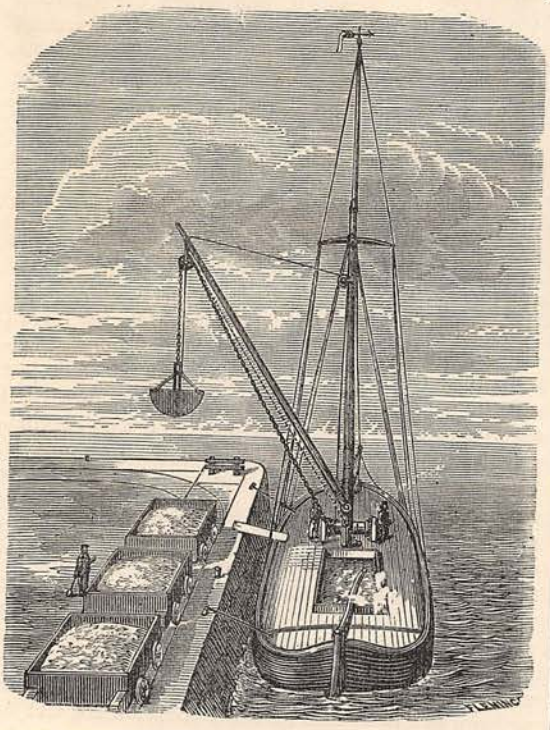
could not otherwise go; and in this way it is proposed to transport ironclads through the Suez Canal when they cannot pass it because their keels would touch the bottom.

Rising with the Lark.

Investigations made by a French ornithologist as to the habits of birds have entirely destroyed the lark's reputation for early rising. As a matter of fact he is quite a lazy bird, and does not rise until long after chaffinches, linnets, &c., have had their breakfast. We are informed that the earliest riser is the greenfinch, which gets up from his downy nest and sings at the early hour of half-past one o'clock in the morning. Next, at half-past two, the blackcap begins, and a half an hour later the quail presents itself. Then, an hour later, the first real songster, the blackbird, makes its appearance. At half-past four the thrush is heard to sing. The robin is heard shortly after, followed by the wren. Then, to conclude our list, the house-sparrow and tom-tit appear to warn us, by their merry twitter, of the approaching day.

A Self-acting Bucket.

A dredger in action is not a pretty sight; some would hardly call it an interesting one. Most people have seen the process in full swing at some time or other: bucket after bucket in endless round crawling



up to a certain height, and then casting its dirty contents not only down the shoot into the barge prepared for them, but also scattering them liberally over the unwieldy vessel, and the men employed in the work. But *nous avons changé tout cela.* A very ingenious contrivance has been invented for raising mud, stones, &c., from the bottom of rivers, harbours, and canals, and for doing in fact the work of a dredger without the usual accompaniments which we have vaguely hinted at. The machine has been successfully tested in America and various parts of England and Scotland; and, with a view to its more general use, Messrs. Thomas Christy and Co. have taken the invention in hand, and, under the name of the "Self-acting Bucket," have extended the principle and applied it to other purposes besides dredging.

The plan on which it acts is simple in the extreme. The bucket is made to come asunder at the middle, and its edges at the point of junction of each half vary in accordance with the kind of matter that has to be raised. There is a straight or curved cutting edge for ordinary loose soil or mud, short teeth that fit into each other for cutting through clay or gravel, and strong tines (called a grab) for picking up pieces of rock after an under-water explosion. Two stout chains connect the bucket with a hand-winch or steam-crane—one used for lowering, the other for raising. When lowered the bucket falls wide open into the material which requires lifting, each half being pulled apart by a brake acting upon one of the chains. At this stage the attention is solely directed to the excavation or "howking-up" of the *débris*, and then to the filling of the bucket—work that is completely done by its own weight. As soon as the edges meet again (or, in the case of huge stones, until the pieces are firmly held as in a vice), it is raised by the second chain to the necessary height and swung round for delivery. By throwing the weight upon the first chain, the bucket falls apart and discharges its contents.

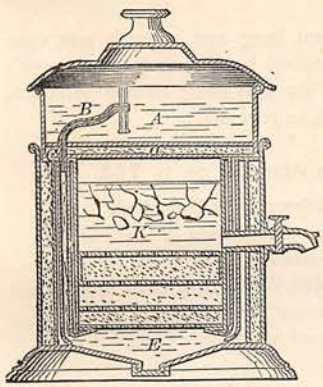
It must be evident that this process combines simplicity and cheapness with as near an approach to cleanliness as work in mud will allow, it being almost impossible for anything to escape from the close-shut bucket. It possesses the further advantage of not being liable to derangement—there being no complicated machinery in connection with it—or, in the event of accident, of being easily repairable.

The wood-cut shows a barge unloading fine material such as ashes, grain, or ballast, with the full bucket in the act of descending. Directly it reaches the waggon the pulling-chain compels it to disgorge; it is then raised, and lowered into the hold where it fills, and so on, the operation being repeated until the barge is speedily emptied, and waggon after waggon loaded. The two chains are worked by the hand-winch placed in front of the mast, but this appliance is used only in those cases where there is not a steam-crane on the wharf. The bucket is entirely self-acting and is under the control of only one man—the man at the winch—to whom, no doubt, passers-by *are* permitted to speak. The whole process effects a great saving of labour, and the bucket ought to be found as useful in raising grain from barges or small vessels, as in dredging mud and other refuse from the bottom of canals or rivers. Moreover, by attaching a huge prong or fork instead of a bucket to the chain, cargoes of manure can be readily "shipped," and as readily removed.

A Water Filter and Cooler.

Very few companies supply drinking water that can be said to be in every respect satisfactory. Though to the naked eye the liquid may seem pure and clear, if a few drops of it were placed under the microscope, that instrument would in all likelihood a tale unfold of living organisms and other ordinarily invisible impurities.

Every one uses water, in greater or less quantities, for drinking purposes, and the necessity of having it quite free from all objectionable matter ought by this time, we should imagine, to be generally understood. Speaking in the abstract, this is no doubt true; but it is very seldom you find people disposed to carry out in practice what they admit to be correct and salutary in theory. To insist, nowadays, upon the value of a filter would be merely to declaim, for every writer on health has expressed a decided opinion as to its sanitary importance. The filter is at once efficacious as a remedy, precautionary in the case of naturally pure water, simple in its mode of operation, likely to keep in good order—subject to certain intelligible conditions—for a few years, and, to crown all, is comparatively inexpensive. It is in fact an institution that ought to be found in every home. But, in spite of obvious considerations such as the above, we greatly question whether this expedient for cleansing water is at all commonly adopted.



Our engraving, from the "Practical Dictionary of Mechanics," represents a mechanical appliance that does a twofold duty. We have here both a filter and a cooler, the water first going through the process of filtration and then proceeding to an ice-chamber, whence a deliciously cool draught may be drawn as required—an important feature, this latter, which would of course be most thoroughly appreciated on a warm summer's day.

Briefly the diagram may be thus explained. The water from the reservoir A above passes into a tube B, whose mouth is vertically adjustable. This tube communicates below with the filter-bed E, and thence the water, by a well-known physical law, ascends till it reaches the ice-chamber K.

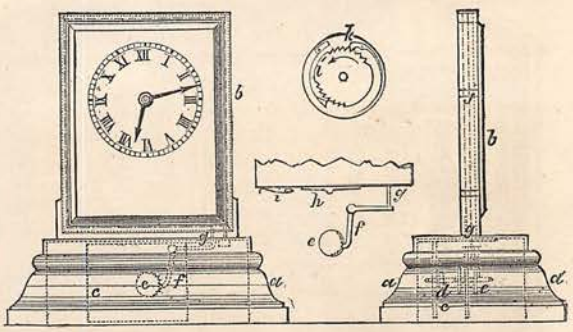
We think that this filter and cooler would be to some extent improved upon, if the water were in the first instance to be placed in the ice-chamber, and from thence conveyed to the filter-bed, from which it could be drawn by the tap. And in order to effect this improvement, we do not see that any very great alteration would be necessary in the apparatus as it stands.

A Puzzle Clock.

A Parisian clockmaker, well known as an inventor of puzzle clocks, has constructed one which is calculated to puzzle the most ingenious mind. It is a clock which, to all appearance, goes without works. There have been several of these mysterious clocks exhibited lately, the best being by Robert Houdin's arrangement of the double glass plate. This invention consisted of two glass discs placed parallel, and contained in the one circular frame. On one of the discs was marked the dial, while the other turned on its centre, and was attached to the minute-hand. The works of the clock were hidden in the surrounding frame, and the turning of the disc was rendered imperceptible.

The clock shown in our engraving cannot, of course, be constructed on this principle, as the glass plates are square, and, besides, they are apparently fixed in the base support.

The trick, however, can readily be seen on looking at the diagrams. Two plates are provided in the clock, one of which is fixed to the base, and on this plate the dial is marked. Both plates are encased in one frame, *b*, but this is loose enough to allow the



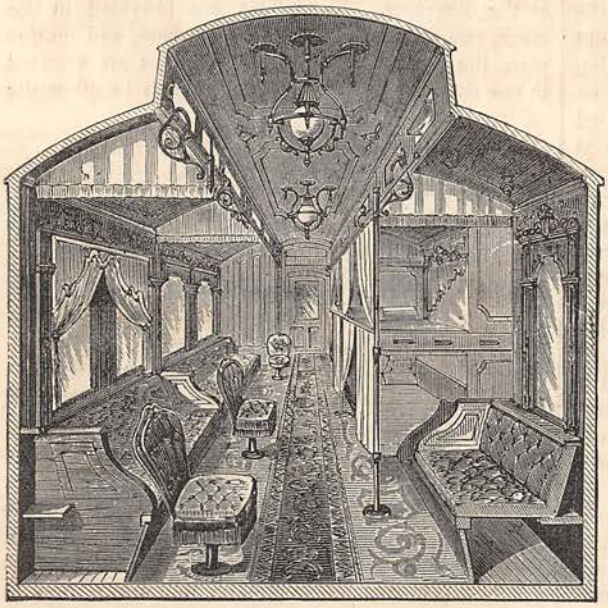
rear plate to oscillate a little. The lower middle figure represents the bottom of the plate, which rests on a balance-beam, *h*. At the base of the clock there is space, *c*, provided for concealing the works, and in this a ratchet-wheel, *e*, containing thirty teeth, is worked once in an hour. The teeth of the wheel *e* at the proper time come in contact with the hook *f*, which moves the bell-crank attached thereto, thus giving an up-and-down reciprocating motion to the rod *g*, which presses against the bottom of the movable glass plate. By this means, and the working of the spring *i*, the plate is caused to oscillate isochronously. The motion of this plate to the minute-hand is communicated by the ratchet gearing provided in an aperture made through the centre of both plates, and represented in the upper and middle figure. The hour-hand of this ingenious clock is worked in turn by the minute-hand and by a neatly concealed piece of mechanism.

A Snug Journey by Rail.

It is a pleasant thing to be able to sleep when taking a long journey by rail or water. A few years ago such

a thing was well-nigh impossible, but now comfortable beds, as snug as one's own room at home, are obtainable to those who are in a position to pay for the luxury. Pullman's cars have already become so popular that other geniuses contrive to bring improvements before the notice of the public. The best of these is undoubtedly the one shown in the accompanying illustration. At night luxurious berths, erected in tiers to the ceiling, are provided for sleeping purposes, and in the day-time the car is converted into a pleasant drawing-room. The chief feature of this improved car is that its weight does not exceed 21 tons, effecting an important saving on other cars, the lightest of which is from 28 to 35 tons.

Annexed is an interior sketch showing a row of berths in proper rig. The car is provided with fixed side seats, of length equal to a sleeping berth. Two revolving chairs are placed in the front of each sofa, which are of great convenience in the day-time, while



at night the seats are removed, and the remaining pedestals serve as supports for fixing the bed. The upper ends of the posts are secured by a bracket attached to the ceiling, and close to the lower portion of each post is a collar, which has a projection to support the lower bed. Near the middle of the post is another projection, to receive and support the front and end rails of the upper berth. The ends of the rails next to the side of the car are socketed in the wall of the car itself, and the bottom of the berth is supported by "cleats" (or straps) on the inner sides of the end rails. This arrangement is of untold advantage, as it affords the unusual opportunity of erecting a single bed independently of another, and all the berths may be fixed together as occasion requires.

Ventilation for the lower berths is insured by a vertical flue which is erected between the windows of the car-wall. The flue extends almost to the top of the car, and has an aperture outside, so that the movement of the vehicle draws up the air from the lower berths, thus insuring a thorough ventilation. This is a most necessary advantage, and one calculated to make these temporary homes much more healthy and agreeable.

There was a time, not long ago, when it was considered a hardship to travel by night; but now, with all the improvements for travelling accommodation, the order of things will be reversed.

Answer to Acrostic on p. 763.

O ctavia (*Antony and Cleopatra*).
L ucetta (*Two Gentlemen of Verona*)
I mogen (*Cymbeline*).
V iola (*Twelfth Night*).
I sabel (*Measure for Measure*).
A driana (*Comedy of Errors*).

Christmas Double Acrostic.

There's commotion in the nursery,
For Christmastide is near,
And children hope that this old friend
Will think of them this year.

This mythical animal never was caught,
Though solemnly hunted and carefully sought.

Pall-Mall contains me always,
And I'm found in every ball;
I'm nothing short of everything,
Although I am not tall.

The ring I gave to him, unknown
He had returned to me,
Yet told me, to a prating boy
He'd given it as a fee.

A sect in China trusting to their reason,
Forsooth! Such folly seems to me mere treason!

The bird he shot. What could he gain?
Destruction followed in its train;
We perished on the watery main.