

## New Process of Steel Casting.

We read in the *American Manufacturer* an account of a new process of making irregular shaped steel castings such as plow-shares, out of fine tool steel, any desired percentage of carbon, without annealing, as in the ordinary "steel casting" processes. It is the invention of Mr. A. J. Nellis, of the Pittsburg agricultural works. In the ordinary method of making steel castings, it is necessary for the steel to be very high in carbon, in order to be fluid enough when melted to run into a fine casting, and the excess of carbon is removed after the casting is made by a process of annealing which requires from 10 to 20 days. By Mr. Nellis's method of making castings, low carbon steel, or ordinary tool steel, may be employed if desired. The mold in which the casting is formed is impregnated with combustible materials, which takes fire the instant that the melted steel comes in contact with the mold. An intense heat appears to be generated, which retains the steel in a perfect fluid condition till it reaches the smallest corners of the mold, and an agitation is caused by which all air and confined gases are allowed to escape from the metal, thereby making the casting free from blowholes. One theory of the action of this process is that the combustion of the materials with which the sand is impregnated consumes all the oxygen of the air within the mold, and the remaining gases have no "affinity" for the steel. The plow-shares made by this process can be forged into any shape required by an ordinary blacksmith, or after it is entirely worn out he may draw it down into tools and cutlery. If the new process succeeds as well as it promises to do, we may soon see steel castings largely used instead of wrought iron or steel forgings for all difficult shapes. Mr. Nellis also has a patent on the mold used for his steel castings, which obviates the trouble experienced with iron molds, of the melted steel adhering to them on all sides, and causing shrinkage cracks, and has all the advantage which iron molds possess of durability and permanence of form. The molds are made chiefly of iron, but with inserted sections of sand. These sections do not adhere to the casting, and shrinkage can take place without hindrance, avoiding cracks or internal strains.

**CANDY AND TEETH.**—*Hall's Journal* comes to the rescue of our candy-loving little ones, and says it is not true that sugar and candies are of themselves injurious to the teeth or the health of those who use them; so far from it, they are less injurious than any of the ordinary forms of food when employed in moderation. It would be a strange contradiction in the nature of things, if sugar and candy in moderation should be hurtful to the human body in any way, for sugar is a constituent of every article of food we can name. There is not a vegetable out of which it cannot be made, not a ripe fruit in our orchards which does not yield it in large proportions, and it is the main constituent of that "milk" which is provided for the young of animals and men all over the world. But to use this information intelligently and profitably, it must be remembered that sugar is an artificial product, is a concentration, and that if used in much larger proportions than would be found in our ordinary food, as provided by the beneficent Father of us all, we will suffer injury. We should never forget that the immoderate use of anything is destructive to human health and life, if persevered in. The best general rules to be observed are two: First, use concentrated sweets at meal times only; secondly, use them occasionally and in moderation.

A simple contrivance has been adopted in some Russian and German rail-rolling mills, with a view to cutting the rails always of exactly the same length. The glowing rails are looked at through a dark glass; when they have cooled to a certain temperature they can no longer be perceived. Using a dark blue or orange-yellow glass, e.g., the rails may still be at a red glow, when the light radiated from them disappears in the dark glass. It may be considered that the light from two rails observed through the same dark glass disappears at the same temperature, and thus one is guided to cutting the rails while in this similar

state, each rail after rolling being allowed to cool till it can no longer be seen at a given distance through the dark glass; thus they can all be cut of the same length. Of course the certainty of the observation is a little affected by variations in the general illumination (dark and bright weather, &c.), but glasses of various shades of colour can be used according to the occasion. The principle has other applications—*inter alia*, a simple and convenient pyrometer may be constructed on it.

Among the vegetable wonders to be exhibited at the Paris Exposition this year will be a section of a trunk of a tree which was 90 metres high, from the forests of the Mississippi. This section has a circumference of about 20 metres. It may give some idea of the difficulties of navigation which are often encountered in the great American rivers through the falling of such trees into the stream. A number of myrtle and citron trees are to be sent from the small principality of Monaco, and in the park of the Champs de Mars will also figure Italian poplars and chestnuts.

M. Förster, of Munich, has recently determined, with a Petteukofer apparatus, the excretion of carbonic acid by a large number of children, from the sucking stage up to ten years, and he finds that for 10 kilogrammes body weight they always excrete about 10 to 12 grammes  $\text{CO}_2$ , or nearly three times the quantity given by adults in similar circumstances. Hence a comparatively larger supply of food is required for maintenance of the body in children than in adults.

**TO PREVENT HONEYCOMB IN CASTINGS.**—Mr. John Bourne, C. E., of Mark Lane, London, has patented a device to prevent honeycombing in castings, by which he extracts from the metal, while in the molten state, the gas or gases by which the honeycombing is produced. The removal of the gases may be effected by the aid of any mechanical means capable of producing rarefaction, such as a common pump, an exhausting jet of steam or other fluid, the hydrostatic gravitation of a column of the molten metal itself, or any other exhausting expedient, by which a vacuum more or less perfect is produced. The molten metal must be exposed to the action of the vacuum in such a manner as to insure the disengagement of the gas from the metal, and for this purpose he submits the metal to the vacuum preferably in a state of minute subdivision. This may be accomplished by allowing the molten metal to run through perforations in a fire-clay block into a tall cylinder, within which a vacuum is maintained. By thus subdividing the metal, and discharging it in the form of a metallic rain into an exhaust chamber, the gases are separated from the metal, and are sucked away by the pump or other extractor in communication with the exhaust chamber. He remarks that it is not intended to subdivide the molten metal (without the aid of a vacuum), for the removal of the gases, nor to attempt to suck away the gases from a vessel filled with molten metal by producing a vacuum above the metal, as the hydrostatic pressure of the metal itself would, under such circumstances, retain the gases within the metal, notwithstanding the existence of the vacuum above it; but he extracts the gases by the conjoint action of the vacuum and of the subdivision, as above explained, or by analogous or equivalent means embodying the same conditions.

## Hints for the Wakeful.

If you cannot get sleep when you first go to bed, says *Hall's Journal of Health*, give orders to be waked up at daylight, get up promptly, do not sleep a wink during the day, go to bed at your regular time, with directions to be waked as before; in a week you will find that you can go to sleep promptly, but then be careful to get up as soon as you wake in the mornings, thus you will soon find out how much sleep your system requires, and act accordingly. Always avoiding sleeping in the daytime; for if you require seven hours sleep, and spend that much in sleep at night, what ever time you spend in sleep during the day must be deducted from that seven hours, or you will soon become

wakeful again. If you wake up in the night, either go to bed two or three hours later or when you wake, get up, even if it be but one o'clock in the morning, and do not sleep a moment until your regular hour for going to bed; and if you go to bed regularly, get up as soon as you wake, and do not sleep in the daytime, you will find out in less than a week how much sleep you require, then act accordingly. Nature loves regularity, and the four hours sleep from ten to two, is worth six hours after twelve o'clock. The great rule is, retire at a regular early hour and get up always as soon as you wake, if it is daylight. If persons have force of will enough to keep from going to sleep a second time, it is greatly better to remain in bed ten or fifteen minutes after waking up, to think about it, and enjoy the resting of that kind of feeling of pleasurable tiredness which comes over us on waking, especially if we have taken more exercise than usual the previous day, or have been kept up later.

## The Law of Rest.

William Walter Phelps recently made an address on the American habit of hard work before a meeting of physicians and surgeons. Among other things, he said: We are a nation without contentment, without rest, without happiness. In a feverish race, we pass from the cradle to the grave—successful men, to whom life is a failure. Our boys leave the university, when English boys leave their school. Our merchants leave their trade, retiring to some more dignified or honorable work, as they believe it, at an age when the German merchant first feels the master of his trade. We are always anticipating the future, forcing the task of a whole life into part. Worse, we are not content with doing a year's work in a month in our own calling, but we must do enough in all other callings to win distinction there. In other lands it is enough to be a lawyer, physician, clergyman, merchant. Here we are nobodies unless we fill the sphere of all human occupations. He must be a statesman, and know political science as if already in office. He must be an orator, and ready to persuade and instruct—a wit, to shine at the dinner-table—a litterateur, a critic. There is too much human nature in man for this to mean anything except a discontented life and a premature death. And the remedy?

Correct public opinion. We must honor the man who faithfully does his task, whatever it be. Not the task, but the faithfulness with which it is done, must be the measure of the honor. Then men will be content with their father's house or their father's trade. This will give us that family association which is a sure pledge of good conduct and patriotic love. This will give us too that traditional aptitude which alone gives great mechanical excellence. It will not be a bad time for American manufacturers when we find stamped on them, what Mr. Griffin finds on Japanese bronzes—"Done by the ninth bronzer in this family." Then men will keep the occupation of their youth for their age, and having leisure, will build the foundations broad enough to withstand bankruptcy. Then men will seek excellence in other callings, and not compete, with the excellent in other callings. Then men will alternate labor with rest, and obey the law which God has written on creation—God, who Himself rested after toil—God, who shrouds the earth with the night, that it may take its daily sleep—God, who speaks to the torrent to stop at once amid its maddest plunge.

**HOW POISONS ARE SPREAD.**—Mr. G. Owen Rees, Consulting Physician to Guy's Hospital, London, has called public attention to some unexpected sources of arsenical poisoning. The green calico lining of bed-curtains has been found to have produced, for months, severe symptoms, which were treated as those of natural disease, without benefit to the patient. When the curtains were removed the patients at once recovered their health.

**RAT-PROOF PAINT.**—Mix finely powdered glass with pitch or coal tar and rosin, and paint your grain bin with two coats, and it will be too much for rats' teeth. They don't like the tar, and the sharp glass is still more disagreeable.