

THE ART OF INVENTING.

Many persons suppose that the capability of inventing is wholly a natural gift, but such is not the case. It is just as much an acquired art as any other profession. In order to insure success as an inventor, it is necessary for the student to go through a school of inventive studies and to confine his productions to a particular class. If a mechanical inventor he must understand mechanical movements and powers, as well as metals and timber and how to work them. He must study the relation between causes and results, he must acquire a knowledge of drafting, and must learn what has been accomplished in his particular line.

It is true that some wonderful inventions have been made by persons entirely unacquainted with the particular branch in which they were working, but such instances are rare. The more extended the knowledge which the artisan possesses, the more likely is he to make a valuable improvement. But constant and unceasing study is entirely unnecessary; in fact it tires out the mind, which, like the fatigued body, must have rest before it can successfully pursue its laborious journey. If, therefore, the mind becomes weary and confused, it is better to drop the subject for a time and take it up again.

Nearly twenty years ago, in the city of Boston, a friend of ours, still living, invited us to accompany him to see a model of an invention. We went with him, and a very enthusiastic young man showed us a beautifully made model, mostly of finished brass, of a ship with a revolving mast geared into the paddle wheels in order to propel his ship against the wind. He said that he took the idea from a feed mill, run by wind, near Charlestown bridge. "But," said our friend, "that feed mill is on *terra firma*; but where will your ship be going when afloat? With the wind blowing against the revolving sails, you will have to cast anchor in order to keep it from blowing backwards." He had never studied cause and effect; and he told us that he had spent six months and nearly \$2,000 in trying to accomplish an impossibility. Years of precious time and thousands of dollars are annually lost in a similar manner. Many hundreds of men have labored at models and expected to make fortunes by running an overshot or breast wheel in a dead pond by causing it to pump up its own water, and by similar impossibilities.

The educated inventor will never run into such wild cat schemes. But as he becomes more and more acquainted with the arts and sciences, he will find that every step forward must be directed to a practical result; and at last, when his life's work is done, he will see that all he has gathered will be only a drop from the ocean of Science, which lies still spread before mankind for other minds than his to continue to explore.

MANUFACTURE OF ARTIFICIAL BUTTER IN NEW YORK.

We have had occasion in former numbers of our paper to describe the new processes of making butter from substances other than milk. It is to France that we are indebted for the practical inauguration of this new industry, which has now been transplanted to this country and is in full operation in this city. We devote a considerable space in the present number to the illustration of the devices and method of working, as practiced here, in which our readers, we have no doubt, will be much interested. Similar factories will be established in other cities and the manufacture promises to become extensive.

SCIENTIFIC AND PRACTICAL INFORMATION.

CARBOLIC ACID.

Carbolic acid is now so generally employed as a disinfecting agent that a *resumé* of the various forms in which it is made, in the largest establishment carrying on its manufacture in England (Calvert's), may prove of interest. 1. Solid carbolic acid of three different qualities, the point of solidification of which varies from 81° to 108° Fah. 2. Liquid acid of two different qualities, constituted almost entirely of cresylic acid. According to Mr. Calvert, the disinfecting properties of the latter substance are the same as those of carbolic acid. 3. Soaps in which the proportion of carbolic acid varies from 5 to 20 per cent, according to the uses to which they are to be applied. 4. Disinfecting powder, composed of silex and 15 per cent cresylic acid. The silex is obtained from alum factories, where kaolin is treated with sulphuric acid. The disinfecting acids become thoroughly incorporated with it, forming a dry and pulverulent substance.

THE PASSAGE OF GASES THROUGH VEGETABLE COLLOIDAL MEMBRANE.

The experiments of M. Barthélemy lead to the conclusion that the natural colloidal surfaces of vegetables have, for carbonic acid, an admissive power which is from thirteen to fifteen times more considerable than that for nitrogen, and from six to seven times greater than that for oxygen. These experiments, proving the dialysis of carbonic acid through the cuticle of leaves, are of the same nature as the investigations of Dutrochet on membranes and aqueous solutions to determine the endosmose by the cellules. In a word, cuticular respiration appears sufficiently proved by the presence of this membrane on all the organs.

THE FAIR OF THE AMERICAN INSTITUTE.

There have been some alterations in the awards to be given by the American Institute during the present exhibition which, it seems, will enable the judges to discriminate more closely as to the relative merits of articles entered for competition. Last year, the grand medal, a distinction requiring originality and an extraordinary degree of excellence and utility in the invention for which it might be given, and

the medal of special award, for the best of a class, general excellence, etc., constituted the list; now, however, another medal has been added, so that the three, respectively of gold, silver, and bronze, with of course the inferior honor of a favorable report, will render the task of thus signifying the value of a device one of much greater simplicity. It is frequently the case that committees feel that an article deserves distinction and yet not so high an honor as another device of far greater utility, while neither may merit the highest award; and similarly, when there are several inventions all of one class and yet each possessing important peculiarities, it is equally difficult, with but a single award to bestow, to determine to which exhibitor it justly belongs. In such instances, the matter is usually compromised by recommending the granting of the same distinction to a number, with the obvious result of causing general dissatisfaction on the part of those who consider their devices merit some special honor, and engendering the ill feeling and dissensions caused by each individual claiming to have received the highest award. Another medal, though it may not entirely obviate this trouble, will perhaps render it an easier matter to stamp at once the best of a class, and yet grant to others of the same category a fair distinction, thus at least raising the standard and enhancing the value of the premiums.

Since our last visit, we note many additions to the display, but, with that tardiness which now seems to be the rule, many intending exhibitors have not yet appeared or, having entered, have not got their articles in proper shape. The fair has now been open nearly a month, and it seems to us high time that its contents should be finally arranged.

MACHINISTS' TOOLS

presents some specimens of excellent workmanship and several novel improvements worthy of mention. Among others, we notice a planer from Messrs. Hewes & Phillips, which has a worm wheel outside of the table connecting with the latter by a rack and pinion. A lathe by the same firm has a novel arrangement of back gearing which renders its construction of much more compact form. Van Haagen & Co., exhibit a friction planer which operates excellently and without any perceptible noise. Underneath the table and in the direction of its length is arranged a rack with teeth running longitudinally; into this mesh the projections on a friction wheel of the usual form, somewhat similar to the variety employed on ordinary friction hoisters. Connecting with the pinion is a shaft communicating with bevel friction gearing and a clutch outside, by means of which the motion of the table is changed. It might be supposed at first sight that the gearing under the table would slip under a heavy strain, but it seems that such is by no means the case. A rotary shaper, displayed by the above firm merits mention as a new machine capable of a large number of uses particularly in boring, planing, and keyway cutting, etc. An attachment to this, and in fact to any machine having either revolving or stationary spindles, is a new expansion boring tool, which consists of a slotted hub in which is screwed a shank for attachment to the spindle, and in the cavity of which is pivoted the end of an arm. The inner extremity of the latter is a worm wheel, the worm acting in which passes through the hub and is turned from outside. When the worm rotates, the arm is set to any desired angle, and there are arrangements for firmly holding it in place. Its outer extremity carries the boring tool.

ROCK DRILLS

There are several on exhibition, but the Ingersoll is, just at present, the only one in actual operation. This machine has a novel improvement for holding the drill bar, which forms an automatic connection. Three tapered gibs, half round so as to fit the bar, are arranged to fit over and enclose its upper end. The collar drops over the gibs, thus wedging them against the bar firmly, grasping and retaining the same and allowing work to immediately commence at the next down stroke.

STONE PULVERIZING

is an operation of some interest carried on by the Zetetic Pulverizer. This machine consists of a stout winged wheel revolving at high speed in a heavy vertical circular box. Stone in moderate sized lumps is fed in through a hopper, and by centrifugal force dashed around within the box, emerging into an enclosed room in a state of almost impalpable dust.

White, Clark & Co. exhibit a means of elevating water to any height by a combination of their centrifugal pumps. Two small machines are used, one mounted horizontally on a vertical tube, and another similarly arranged at a distance above the former on a prolongation of the same pipe. The shaft passes straight down through the latter. The lower pump draws water through the lower part of the tube, and its discharge is led by a bent pipe to the upper portion, to be acted upon by the pump above. The two portions of the pipe are separated by a stuffing box, through which the shaft passes. Burden's

VACUUM PUMP

is exhibited in several different sizes, and from its odd form and appearance attracts considerable attention. Each machine consists of a number of iron vessels in the shape of bell glasses, a description of one of which will answer for all. The mouth of the receptacle, which is placed in a trough, is closed by a grating, above which is a large valve lifting inwards. Steam enters from above, on the valve being lifted, and filling the vessel condenses, thus drawing in first a small stream of water from a valve about midway up the side, which promotes further condensation. The vacuum formed finally lifts the large lower valve, and the vessel fills completely. Then two other escape valves, opening out-

ward near the bottom, open, and the water is accelerated in the discharge by the steam entering as before.

Ryder's grate bar is an invention of novelty, and consists in every alternate bar of the grate being made corrugated on top, and movable, in a longitudinal direction, by means of mechanism connecting with a handle outside. It is claimed that the fires can be thus kept clean with great facility and little trouble. The device, we understand, is to be practically tested under one of the boilers.

A novel feeding mechanism for sewing machines is exhibited in the main hall, by means of which almost any kind of ornamental stitching used for belts, harness, shoes, etc., can be admirably made. As displayed, it is simply a cam attached to the shaft of the feed wheel, so that the latter is carried sidewise at various times so as to produce a certain pattern by moving the cloth under the needle. A different cam is required for each variety of stitch. Near this machine is an

APPARATUS FOR SEWING ON BUTTONS,

which, if it could only be arranged for every purpose, would be an inestimable boon to the unmarried male population of the country. The present device is adapted for shoe buttons—small round affairs with projecting eyes—and uses the ordinary button just as it is supplied to the trade. The thread leads under the work, and the needle comes down through the eyes of the buttons, which slide down one at a time from a small inclined trough. A barb at the end of the needle catches the thread, carries it up through the leather, and makes any number of chain stitches, changing from eye to outside. As soon as the button is firmly fastened, a loop of the thread, which projects through on the upper side of the leather, is slipped over it. The next button can be secured at any distance from the first, the thread leading along the under side of the material.

R. M. Hoe & Co. exhibit a remarkably fine assortment of saws, besides knives for cutting rubber and cork. The Meriden Britannia Company also deserve a word of praise for an exceptionally good display of silver ware in novel and beautiful designs.

Sir Edwin Landseer.

Sir Edwin Landseer, the celebrated English painter, is dead. It is hardly necessary for us to particularize the works which have rendered his name famous, as no modern paintings are more generally familiar. As a delineator of animal life, Landseer had no superior; and although critics complain that he marred the effect of his pictures by semi-humanizing his brutes, still it may with truth be asserted that such an appeal to a popular taste served in the main to lighten the admiration of the world for his efforts, even while a more austere judgment condemned and lamented it as mere vagary of humor.

Springing from a family of artists, Landseer began his labors at a very early age, and exhibited his pictures in public when he had reached but fourteen years. Of late, however, his powers became impaired, and for many years past nothing has left his easel worthy of the great reputation which he had achieved. As a sculptor, a branch of art in which he was induced to try his skill almost by popular acclamation, he produced but one important work, namely, the couchant lions on the Nelson monument, in Trafalgar Square, London, which, however, it is generally admitted, afford no particular evidence of his genius or ability.

His chief forte lay in the representation of horses, dogs and game, of all of which he was unaffectedly fond, and painted with a wonderful fidelity to nature. Most of his works have been engraved, and copies are sold in most of our picture stores. Landseer was born in 1802 and was knighted in recognition of his merits in 1850.

Joseph L. Hewes.

We notice, with much regret, the death of Mr. Joseph L. Hewes, a prominent manufacturer and inventor, resident in Newark, N. J. Left an orphan at fifteen, Mr. Hewes was taken under the guardianship of Seth Boyden, who, after giving him the benefit of an excellent education, entered him as an apprentice in his shops. From this period the subject of our sketch evinced great aptitude for invention, as well as no small mechanical skill, and, after several years of labor for others, in 1846 started in the business of manufacturing machinists' tools and engines in York. At the beginning of the war, Mr. Hewes rendered very valuable assistance in improving and remodeling arms, and it is stated that, through his timely aid, the first eight thousand of New Jersey volunteers were at once equipped for service. He had seven new inventions put in operation last year, and it is believed that the strain upon his energies in making some new machinery at the Industrial Exposition produced his fatal illness.

A JUST AWARD.—The self-acting lubricating devices of Messrs. Nathan & Dreyfus, of No. 108 Liberty street in this city, are, we notice, among the exhibits from the United States to which the highest prize, under the rules of competition, was awarded at the Vienna Exposition. This is a well merited recognition of valuable inventions which have excellently withstood the test of experience.

PROGRESS OF THE HOOSAC TUNNEL DURING SEPTEMBER, 1873.—Headings advanced westward, 184 feet; eastward, 132. Total during month, 316 feet. Whole length opened, westward, 14,577 feet; eastward, 9,902 feet. Aggregate opened to October 1, 24,479 feet. Length remaining to be opened, 552 feet. The whole length of the tunnel, is 25,031 feet.