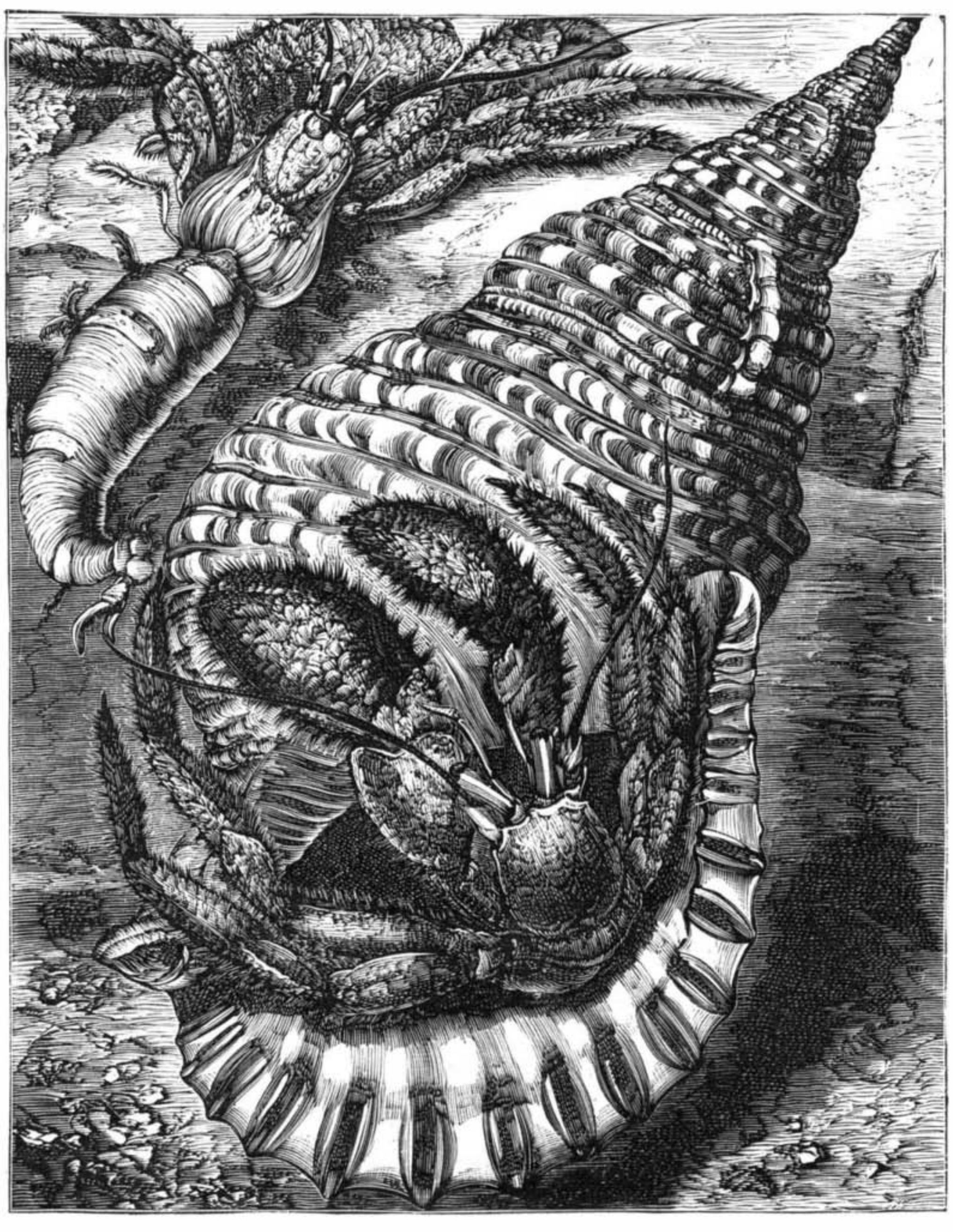
of little rods articulated one to another, and extending around the hair. Some of these rods appear to blend with the proper substance of the nodosity, others terminated at some distance, either by an ampulliform swelling or umbellate extremity. It is difficult to say whether these rods are the mycelium of the fungus which forms the cellular mass of the nodules, or whether they are independent of the latter. Nowhere in the substance of the hair could any trace of a vegetable parasite be discovered after the action of liquor of potassa or acetic acid. The interior of the nodules was composed of a cellular stroma similar to that covering the periphery, and on it were some large cavities containing one or two large colorless cells. A writer in the same journal of a subsequent date says that he has a patient suffering from this rare disease in England. He believes it to be the disease described by Hebra as *tricoresis nodosa*. He states that it is not infectious, and that this fact, combined with its resistance to every method of treatment and his inability to discover any trace of a fungus, has led him to abandon all theories of its fungoid origin.

### THE CRAFTY HERMIT CRAB.

There are many species of hermit crabs, those of the tropics being the largest and handsomest. This odd creature inhabits the shell of some mollusk in which it can bury its unprotected tail and into which it can retreat when threatened with danger It usurps the deserted home of various mollusks. according to its size When young and small it is found in the shells of the tops, periwinkles, and other small mollusks; and when it reaches full age it takes possession of the whelk shell and entirely fills the cavity.

The crafty hermit crab is found in the Mediterranean, and, among other shells which it inhabits, the variegated triton is known to be a favorite. In the illustration, which we take from Wood's "Natural History," the crabs are supposed to have fought for the shell, and the vanquished is seen on the ledge above, whither it has been flung by the conqueror.



THE CRAFTY HERMIT CRAB.

### Heredity.

At the last session of the National Association, in this city, October 8, Professor Alpheus Hyatt, Custodian of the Boston Society of Natural History, announced that the Massachusetts Board of Health had undertaken to investigate the laws of heredity, and was about to make extensive circular inquiries in that department of research. One idea is to trace in direct and indirect lines all hereditary personal peculiarities, large size of nose, peculiar shape of ears, and features of that sort. It is thought by sending out blanks in this country and abroad, many replies will be received. These blanks provide for a collection of statistics upon which can be based an investigation of the laws governing the inheritance of pathological conditions, abnormal characteristics, and any marked family peculiarities. It is also desired to determine the age at which these conditions appeared in ancestor or parent, and the age at which they became perceptible in the descendants or children. Some characteristics remain unchanged in their mode of appearance through many generations, while others vary constantly, sometimes with a periodicity which implies some regularly recurring cause, and sometimes with a very confusing irregularity. It has been observed that normal or abnormal characteristics show a decided tendency to appear in descendants at an earlier age than that at which they first showed themselves in the ancestor or parent. If the answers are sufficiently numerous, the results when tabulated ought to be of value also in the history and classification of hereditary diseases. The Board will furnish these blanks to all who will use them, and they are to be returned to Professor Hyatt.

### Scientific Reliance on Soap.

Dr. Richardson lectured recently in this city on the germ theory of disease. He acknowledged his obligation to Tyndall for his microscopic investigation on air dust, spores, and other comforting and salutary topics. It is worth while for common people to learn that 50,000 typhus germs will thrive in the circumference of a pin head or a visible globule. It is worth while for them to note that these germs may be desiccated and be borne, like thistle seeds, everywhere, and, like demoniacal possessions, may jump noiselessly down any throat. But there are certain things spores cannot stand, according to the latest ascertained results of science. A water temperature of 120° boils them to death, and soap chemically poisons them. Here sanitary and microscopic science come together. Spores thrive in low ground and under low conditions of life. For redemption, fly to hot water and soap, ye who live in danger of malarial poisoning. Hot water is sanitary. Soap is more sanitary. Fight typhus, small-pox, yellow fever, and ague with soap. Soap is a board of health.—*Philadelphia Press.*

### Preservation of Food by Gelatine.

The subject of food preservation has recently acquired a new development from Dr. Campbell Morfit's new "Gelatine Process," which has several points of superiority over most of the older plans, the chief of these being the use of a preservative which is itself an article of food. The experience of a good many months has tended to show that food preparations (many of them, such as cabbage, tomato, milk, and meat, of a perishable nature), when prepared with gelatine, and dried so as not to contain more than 10 or 12 per cent of moisture, do not become mouldy even when exposed to warm and moist air. A good idea of the nature of Dr. Morfit's invention may be obtained from the following method of preserving milk:

One pound of gelatine is dissolved in one gallon of milk at a temperature of 130° to 140° Fah., and the solution allowed to set into a jelly; the latter is then sliced and dried. By using these slices for gelatinizing a second gallon of milk, a jelly is obtained in which the milk solids are just doubled in amount. The process is repeated until the original pound of gelatine is incorporated with the solids of ten gallons of milk. One application of this process, which is theoretically excellent, is the dissolving of gelatine in lime juice, adding sugar, incorporating the mixture with powdered navy biscuits and pressing in moulds, thus affording lime juice in a portable form. This preparation has become an article of commerce. The range of materials to which the gelatine process is applicable is a wide one; according to all accounts Dr. Morfit's invention has already been successfully applied in several directions, and seems to be full of promise for the future. The "Thao," or seaweed jelly, is well known to possess remarkable preservative properties, and might perhaps, in some cases at least, serve as a substitute for the animal gelatine.

### To Turn Oak Black.

The *Revue Industrielle* states that oak may be dyed black, and made to resemble ebony, by the following means. Immerse the wood for forty-eight hours in a hot saturated solution of alum, and then brush it over with a logwood decoction, as follows: Boil one part of best logwood with ten parts of water, filter through linen, and evaporate at a gentle heat until the volume is reduced one half. To every quart of this add from 10 to 15 drops of a saturated neutral solution of indigo. After applying this dye to the wood, rub the latter with a saturated and filtered solution of verdigris in hot concentrated acetic acid, and repeat the operation until a black of the desired intensity is obtained. Oak stained in this manner is said to be a close as well as a splendid imitation of ebony.

### Pearl Millet.

Pearl millet has been cultivated for some years as a forage plant in some of the Southern States, as "African cane," "Egyptian millet," "Japan millet," and in some places as "horse millet," but little was known of it at the North before last year, and then only in such small quantities as to hardly allow of a fair trial. From what we saw of it in 1877 we determined to give it a thorough trial this season. A piece of good strong loamy ground was prepared as if for a beet or turnip crop, by manuring with stable manure at the rate of ten tons to the acre, plowing ten inches deep, and thoroughly harrowing. The millet was then sown in drills eighteen inches apart, at the rate of eight quarts to the acre. We sowed on the 15th of May, about the date that we plant corn; in twelve days the plants were up so that a cultivator could be run between the rows, after which no further culture was necessary, for the growth became so rapid and luxuriant as to crowd down every weed that attempted to get a foothold. The first cutting was made July 1—forty-five days after sowing; it was then seven feet high, covering the whole ground, and the crop, cut three inches above the ground, weighed, green, at the rate of thirty tons per acre; this, when dried, gave six and a half tons per acre as hay. After cutting, a second growth started and was cut August 15—forty-five days from the time of the first cutting; its height was nine feet. It weighed this time, at the rate of fifty-five tons to the acre, green, and eight tons dried. The third crop started as rapidly as the second, but the cool September nights lessened its tropical luxuriance, so that this crop, which was cut on October 1, only weighed ten tons green and one and a half dried. The growth was simply enormous, thus: First crop, in forty-five days, gave thirty tons green, or six and a half tons dry; second crop, in forty-five days, gave fifty-five tons green, or eight tons dry; third crop, in forty five days, gave ten tons green, or one ton and a half dry. The aggregate weight was ninety-five tons of green fodder in one hundred and thirty-five days from date of sowing, and sixteen tons when dried to hay. This exceeds the clover meadows of Mid-Lothian, which, when irrigated by the sewerage from the city of Edinburgh, and cut every four weeks, gave an aggregate of seventy-five tons of green clover per acre. There is little doubt pearl millet is equally as nutritious as corn fodder, which it resembles even more than it does any of the other millets. We found that all our horses and cattle ate it greedily, whether green or dry. If sowing in drills is not practicable it may be sown broadcast, using double the quantity of seed, say 16 quarts per acre. The ground should be smoothed by the harrow, and again lightly harrowed after sowing; if rolled after harrowing, all the better. I know of no farm crop that will better repay high manuring, but so great is its luxuriance that it will produce a better crop without manure than any other plant I know of. In those parts of the Southern States where hay cannot be raised, this is a substitute of the easiest culture, and being of tropical origin, it will luxuriate in their long hot summers; even though our Northern seasons may be too short to mature the seeds, our experiments in New Jersey this summer show what abundant crops may be expected if the similar conditions are secured. Pearl millet as a fodder plant presents a new feature in our agriculture, and I feel sure that within ten years we shall wonder how we ever got on without it.—*Peter Henderson in the American Agriculturist.*

### Dairy and Poultry Produce in America.

At the annual meeting of the National Butter, Cheese, and Egg Association, at Chicago, the secretary called attention to the fact that the dairy product exceeds in value the entire wheat crop of America. The whole number of cows in the United States is 12,000,000; average value, $40; total value, $480,000,000. The value of their sustenance is estimated at $720,000,000. The value of the entire cheese product of the United States is set down at $36,000,000, and the value of the whole make of butter for 1877 at $175,000,000. To these sums must be added the value of milk condensed for export and that used in families. The quantity of cheese made the past year exceeds that of any other year in the history of the American dairy. It amounted to 300,000,000 lbs. The exports for 1877 were 107,364,666 lbs. England took about 90 per cent., or 95,871,370 lbs., valued at $11,303,185; Scotland took 9,069,693 lbs. The exports of butter in 1877 were 21,527,242 lbs., value, $4,424,616, showing a falling of from 1865, which was 21,388,185 lbs., value, $7,234,173. In 1863 it reached 35,172,415 lbs., value, $6,733,743.

There were received in the city of New York alone, in 1877, 530,000 barrels of eggs, valued at $9,000,000. Allowing that city to use eggs in proportion to its population, the entire consumption of the United States would be 10,600,000 barrels, which, at New York prices, would be $180,000,000.

In 1877 over 34,000,000 lbs. of poultry were consumed in New York, including Brooklyn and Jersey City. At this proportion, 680,000,000 lbs. of poultry were consumed in the Union in that year. The total estimated value of the milk, cream, butter, cheese, eggs, and poultry was $848,000,000.

## Australian Gum Trees.

A correspondent in the London *Graphic* gives the following account of the variety of gum trees found in Australia and the uses to which they are adapted:

One of the Australian gum trees (*Eucalyptus globulus*) has been largely planted in North Africa and South Europe as a remedy for malaria. Through its agency the ruin dotted Campagna, some say, is once more to be thickly peopled. The purifying influence steams from the leaves, being one of the volatile oils which make the air of the Australian bush so deliciously fragrant to the camped out traveler, awakened to see the sun rise by the harsh and saucy sounding cackle of the laughing jackass; but which, when the sun has attained his full strength, give to the atmosphere, where the scrub stands thick, somewhat of the oppressiveness of excessive incense.

The eucalyptus which has found favor with European planters is the blue gum, so called from the color of its leaves, but four stand above it in the list of richness as oil yielders.

First stands the dandenong, or narrow leaved peppermint (*E. amygdalina*), a tree which is known to have attained the height of 420 feet. Another measured eucalyptus was as high as the Great Pyramid; and it is supposed there are even loftier trees of the kind. Before these Titans were discovered the greatest tree giant known in Australia was a Karri, 400 feet high, within whose hollow trunk three mounted men with a led horse could turn. It would seem, then, that even California pines are overtopped by Australian gum trees; and after such figures "as tall as the monument" sounds somewhat like "as big as a shrimp." As a timber tree, the peppermint is chiefly useful for the construction of the gray railed fences with slip panels which form so characteristic a feature of the landscape in settled and semi-settled Australia—a poor substitute, in a picturesque point of view, for our variously luxuriant hedges, which, I believe, have been reproduced in Tasmania. Coarse paper might be made from the inner bark of the peppermint; its bark, generally, contains 20 per cent of tannic acid; and it exudes a gum resin.

Next comes the mallee tree (*Eucalyptus oleosa*), a small tree covering thousands of acres of what is called from it Mallee scrub. It may be called a vegetable camel; its roots retaining so much water that travelers through the wilderness rip them up for refreshment.

The ironbark (*E. sideroxylon*) stands third. Its name explains itself. It might be called the rhinoceros of timber trees. The wood which its rugged bark covers is close grained, greasy, and almost imperishable; and accordingly is used in ship building, and for cog wheels, spokes, shafts, and poles.

The white gum (*E. goniocalyx*), which follows, is another giant, utilized by builders and sometimes by coopers. Packing paper can be made from its bark, which yields about 18 per cent of potash; its wood about 20 per cent.

Bloodwood (*E. corymbosa*) exactly tics blue gum as an oil producer, each yielding 12·50 per cent. Its bark makes strong wrapping paper. Its wood is red (as might be inferred from the name), and of a good grain, but so thickly veined with resin that it is chiefly used for fuel.

The blue gum runs up to a height of 300 feet, half of the huge bole without a branch. House builders, coach builders, ship builders, and civil engineers make good use of it, and from its bark also paper can be made.

Stringybark (*E. fabrorum* or *obliqua*) is the next in order. It is a huge tree occurring in vast numbers, and although it warps and (dry) rots readily, it is much used for fences and shingles because it splits so easily. The blackfellows make spear strings out of its fiber. Printing paper and pasteboard can be made out of its bark, which is used for roofing bush huts. Messmate (*E. fissilis*) yields a bush carpenter's and wheelwright's wood. The blackfellows use it for spears.

Another peppermint (*E. odorata*), on whose leaves the opossums feast, save for the oil in them is not a very note worthy tree. Woollybut (*E. woollsii*) yields a hard, red, straight grained timber.

The red gum (*E. rostrata*) is the common gum tree of Australia, growing plentifully along the banks of creeks and rivers. It yields a hard, red, curly grained wood, almost as indestructible as that of the Jarrah, or Swan River mahogany, which defies wet, dry rot, and white ants. Its gum is prescribed for chronic diarrhea.

The manna tree (*E. viminalis*) runs from 50 to 120 feet in height. The blacks make canoes and drinking vessels out of its bark, and shields out of its wood. Its leaves in early summer are covered with white manna, which falls like snow when the wind stirs them. Another kind of manna, the secretion of an insect, candies the leaves of a eucalyptus in the mallee scrub. A delicious lemon scented perfume is obtained from the leaves of the *Eucalyptus citriodora*. An Australian town was for some years lighted with gas distilled from gum tree leaves.

There are other eucalypti; among them, the box (*E. leucoxylon*), which yields a timber hard and greasy like the ironbark's; the gray box (*E. dealbata*), very similar in its qualities; the mountain ash (*E. inophloia*), supposed to resemble its European name giver, the mountain white gum tree (*E. Gunnii*), which grows to a greater height on mountains than in plains; the broad leaved box (*E. acmenoides*), and the blackbut (*E. persicifolia*), which yields a timber like the bloodwoods. Altogether, the gum tree has good right to be called the Australian oak, and can far more safely be introduced at random into an Australian picture than a palm tree into an Indian one.

## Frauds in Wine Making.

If, as has been said, intelligence was bestowed on man only for the purpose of increasing the number of his resources, it must be confessed that he has shown no want of generosity in his various applications of this gift; and nowhere may this be observed to a better advantage than in those multitudinous and ingenious methods used by him in the sophistication of the articles in common use as food and drink. There is, perhaps, no article of daily consumption that undergoes more and a greater variety of adulterations than wine.

Indeed, not only is it adulterated, but much of the liquid we know by this name is entirely innocent of any grape juice at all. For instance, the sherry for which Hamburg has long enjoyed a notoriety is not sherry but merely a factitious article; yet this when exported to other countries passes for genuine. True port is very rarely seen in the market, most if not all of the stuff sold under that name being mixtures of elderberry juice and other articles; and Madeira is usually composed of sherry variously doctored. It is well known to those living in France, that Nancy bears the odious name of having been the first to set the vicious example of a systematic adulteration of French wines, both red and white; and that Lorraine, Alsace, and Luxembourg are notoriously the center of an extensive manufacture of spurious wines, some of which owe nothing whatever to the vine. Celebrated brands of champagne, as Roederer and Clicquot, are here concocted from rhubarb juice and carbonic acid. Light clarets, rough red Rouissillon, and other wines, can be produced to suit the most fastidious taste, by merely refermenting squeezed grape husks that have once been used, along with coarse sugar made from potatoes.

We can divide the materials serving for the adulteration of wine into six great classes: water, alcohol, sugary matters, astringent or acid matters, coloring matters, and certain ethers designed for giving the bouquet. This subject of the falsification of wines, to properly treat it, would require a volume; we must limit ourselves here to an enumeration of the coloring matters used, the deleterious character of which is not only exciting the attention of French physicians and scientific men, but of the French government as well. The syndicate of Narbonne have formally complained to the Minister of Agriculture that Portuguese, Italian, and Spanish wines, all colored by the juice of elderberries, enter freely into France. Yet the wine growers of the Narbonne district have themselves learned to make use of the elderberry as well as of materials less innocuous. Fuchsine, which is prepared by adding arsenious acid to coal tar aniline, is used in immense quantities for imparting a fine ruby red, although it is admitted on all hands to be poisonous. There are a host of other coloring materials less dangerous than fuchsine, but still injurious to health, in daily use for the manipulation of wines. There is the decoction of campeachy wood, extract of mallow, cochineal, rosaline (one of the coal tar colors), colorine, black mulberry juice, red beet, poppy, and various fantastically named essences of vegetable, mineral, and animal origin. It is said that in July of last year a single grocer of Narbonne sold ten thousand francs' worth of cochineal coloring to wine growers of the village of Odeillan alone, for the artificial tinting of poor and pale wines. M. Paul Massot, the representative of the Eastern Pyrenees in the French Assembly, has become a leader in a crusade for the repression of the new frauds in the manufacture of wines, and has laid before the government a mass of authentic evidence on the subject.

It was proved, for instance, by a careful analysis, that a quart of one certain kind of wine contained no less than half an ounce of alum; and also that the red extract of coal tar, called grenate, which was formerly thrown away as worthless, now commands a high price as an ingredient in the composition of the fuchsine, which is tossed by the hundred weight into wine vats. Happily chemistry has supplied us with the means of detecting these additions, and one of the best, simplest, and readiest methods of doing this we owe to a chemist of Nancy, M. Didelot. The test is merely a tiny ball of gun cotton. This dipped into a glass of the suspected wine, and then washed, will resume its whiteness if the wine be pure; if not, it will retain the red color due to the poisonous fuchsine. The addition of a few drops of ammonia gives a violet or a greenish hue when vegetable matters have been used for imparting the desired color. Other and more complicated tests have also been devised; and with the aid of acids, ethers, peroxide of manganese, and chloroform, the frauds of the wine maker have been completely exposed. Benzine forms, with fuchsine and its allies, a red jelly that floats on the surface of the discolored liquor, and by skillfully conducted processes a precipitate, varying in color, can, in every instance, be obtained.

A new industry, which is daily tending to become more and more important, is that of the manufacture of ethers of a complex composition, for the purpose of giving wines particular bouquets. By the addition of a very small quantity of these, new wines may be converted into the semblance of old in a very minutes, or certain poor wines be made to resemble those of famous vintages. Thus we see that science is ever busy in her endeavors to increase the number of products that are necessary to our modern civilization! However, the French government and public seem now to have taken alarm, and it is to be hoped that ere long the adulteration, by means of the poisonous fuchsine at least, will be summarily suppressed.

## Improved Copying Pencils.

The pencils so far made to produce marks from which copies could be obtained in an ordinary copying press, had the disadvantage that, consisting of aniline principally, the color of the copy faded very soon. Gustav Schwanhauser has overcome this difficulty by doing away with aniline altogether. He prepares the pencils as follows:

Ten lbs. of the best logwood are boiled repeatedly with 100 lbs. of water, and the decoction so obtained evaporated down to 100 lbs. The liquid is heated to the boiling point, and small quantities of nitrate of the oxide of chromium added, till the bronze colored precipitate formed at first is redissolved in a deep, dark, blue color. The liquid is now evaporated to the consistency of a sirup, and enough of the finest levigated fat clay is added to have 1 part of clay for every 3 or 3½ parts of the extract. To form a good mass to manipulate, a little mucilage of gum tragacanth may be used. It must be observed, that the quantity of nitrate of chromium must be in the right proportion to the extract, as a surplus prevents an easy writing, and a deficiency prevents the easy solubility of the pencil mass for copying purposes. No other sort of chromium will answer the purpose, as they all crystallize, and the crystals formed in the mass will cause the pencil to be rough and brittle. Nitrate of chromium does not crystallize; its combination with the extract of logwood is the most easily soluble and the blackest ink.

The nitrate is prepared as follows: 20lbs. of chromic alum are dissolved in 200 lbs. of boiling water. To the solution is gradually added a solution of carbonate of sodium of the same strength, till all the hydrated oxide of chromium has been precipitated. After subsidation of the precipitate the supernatant liquid is decanted and the precipitate washed with distilled water, till the filtrate does not contain any more traces of sulphate of kalium and sodium, as may be shown by the addition of a little solution of chloride of barium. To the precipitate collected on the filter are successively added small portions of heated pure nitric acid, previously diluted by its own volume of distilled water, in such quantity that on boiling a small quantity of the hydrated oxide remains undissolved. In this way a perfectly saturated solution of nitrated oxide of chromium is obtained, containing no excess of nitric acid. This is a great advantage, since an addition of nitric acid to the ink changes its color to a muddy red. Another advantage is, that no basic nitrate is formed, and no excess of hydrated oxide is contained in the produced salt, as it is the case in most all other salts of chromium. Such basic salts form an insoluble compound with the extract of logwood, instead of entering in solution. The writing furnished by these pencils is easily transferable; it is of a penetrating, jet black color. Alkalies and acids are without any effect on the ink.—*Schweizerisches Gewerbeblatt.*

## Patent Office Library.

Quite a radical change, according to the *Library Journal*, has been made in the management of the Patent Office library, under Prof. Weston Flint, the new librarian. During the past two years a complete reorganization has been made and a complete catalogue compiled, the first one ever issued, although the present library has been in existence since 1836. A small pamphlet was printed in 1847, when there were but a thousand volumes. The list now amounts to 24,000, not including pamphlets and duplicate specifications of patents of the various countries, and although not large, is considered one of the best technological collections in this country. In addition to completing the catalogue, the librarian has arranged a new system of duplicate foreign patents for the various examiners' rooms, thereby saving a vast amount of time in the tedious labor of examination of claims, and also so arranged that the foreign patents are on file in the library in a few weeks after their publication. A complete subject-matter index of the French patents in English is nearly completed, and an English index to *Dingler's Polytechnisches Journal* will be done by the end of the year.

### Great Machine Tool Makers.

William Fairbairn, the celebrated machinist, has left it on record that, when he commenced his career at the beginning of the century, the human hand performed all the work that was done. In these days such a statement seems very strange, and the wonder is how the craftsmen of the days of our fathers managed to get through the work they did. At the present time, in the vast majority of occupations, we have reversed the old order of things, and machinery may now be said to have superseded the use of the ten fingers in most cases where rapidity and cheapness of manufacture are required. It is said that the first person who invented labor-saving machines was Bramah, the maker of the patent lock. He found it necessary to give the greatest exactness to every part of the ward and key of his celebrated lock. This he found very difficult to do without employing the very best workmen, and their charges were so exorbitant that his invention was in a fair way of dropping out of use on account of expense. In this dilemma he was forced to turn his attention to the introduction of machinery to produce with unerring nicety the different parts of the complicated little apparatus with which his name is yet associated. The workshop in which the many clever contrivances to perform this work with speed were invented may be said to have been the training school for the early machinists, whose labors have, within the present century, built up the mechanical greatness of England. Accuracy of machine work before his day was utterly unknown. Watt had the greatest difficulty in getting his first model of the steam engine constructed with sufficient truth to work; its cylinder was not bored but hammered, and consequently was so imperfect that it leaked in every direction, and when his "old white-iron man" died, he was plunged into despair to obtain another skilled man. Even when he had obtained the trained workmen of the Soho Foundry, they found a difficulty at first in constructing working engines after his design. Maudsley afterward, in conjunction with his partner Field, founded in Lambeth Marsh the famous firm which is still carried on under their names. This firm has done much toward training the splendid machinists which have made English work so famous throughout the world. Clements was another inventor who learned his art in the school of Bramah, and afterward worked for Maudsley & Field. This clever machinist invented the planing machine, without which no perfect plane can be made. The value of such a machine is incalculable. Indeed upon the truth of the plane depends the whole value of modern machinery. Of old, by chipping and filing, an attempt to approach the plane was made, but of course perfect accuracy was out of the question. The fame Clements acquired by his planing machine directed the attention of Professor Babbage to him when constructing his famous calculating machine. This instrument was, perhaps, the most wonderful specimen of mental labor-saving machine that was ever conceived. Professor Babbage, indeed, only commenced its construction, and before he had proceeded with the working drawings far, we are told that his ideas with respect to its capacity as a calculating machine developed so rapidly that the government became frightened. Certain portions of this curious engine were, however, furnished by Clements, and remain now, we believe, in the South Kensington Museum, as splendid fragments of mental and mechanical labor. But although the English had not the honor of carrying out the idea conceived by one of her sons, yet it did not fall to the ground. The Messrs. Scheutz, of Stockholm, followed it out, and after many years' labor produced a calculating machine, a copy of which was purchased some years since by the British Government, and was subsequently employed in calculating a large volume of life tables, which, we are assured by the authorities of Somerset House, never would have been undertaken had this machine not been in existence. Everything Clements undertook he did effectually. To this day we all of us have experience of this in the steam whistle, which was invented by him. Perhaps a still greater pupil of Maudsley was Nasmyth. This remarkable man was the son of the celebrated artist of that name, consequently he sprang of a cultivated stock. Nevertheless he commenced work in his master's celebrated shop at ten shillings a week, and worked his way up from the bottom to the top of the ladder in his own walk of art. This ingenious man may be said to have been called forth by Brunel's gigantic design for the Great Eastern steamship. It was originally proposed to propel this vessel by the paddle, but the shaft for this purpose would have been so large that no forging tools then in existence would have been able to turn it out. Brunel accordingly appealed for help to Nasmyth, who responded by sending a drawing, by return post, of his famous steam hammer. It was, nevertheless, determined to substitute the screw for the paddle, and the drawing was forgotten. Some years afterward, however, Nasmyth was visiting a celebrated iron foundry in France, and noticing a piece of forged work that he knew could not have been accomplished by the ordinary means, was curious enough to inquire how it had been produced. The answer was, "Why, with your steam hammer, to be sure." The Frenchman had been shown the drawing, and rightly estimating its value, he had one made.

Large designs call forth large tools, and large tools, in their turn, call forth large designs. Had it not been for Nasmyth's hammer there would have been no such things as ironclads, neither would there have been any of the monster cannon built upon the coil system, as they are at present. The steam hammer enables us to undertake Cyclopean tasks which we should never have dreamed of otherwise.

The last and best known machinist of the goodly band that issued from the establishment of Messrs. Maudsley & Field is Joseph Whitworth. This celebrated iron worker improved upon Clements' planing machine, in his "Jim Crow" Planer. This machine works with a cutter which reverses itself, cutting backward and forward without losing any time. It was at work, it will be remembered, in the Industrial Exhibition of 1862. Whitworth is, perhaps, best known by his rifle gun, the rifling of which is the very perfection of art. Accuracy of work, learned by him from the traditions of the shop in which he was taught, led Whitworth to contrive various machines for the furtherance of that object. He has invented one machine which detects variations of a millionth of an inch. If the reader wishes to measure the difference between the old work and the machine work of the present day, he has only to look down the hold of any small steamer at one of Penn's marine engines, or to behold the splendid specimen on board the Warrior ironclad. This engine was designed also by the Messrs. Penn; and the perfection of its workmanship may be estimated by the fact that when its five thousand pieces were assembled together for the first time, such was the mathematical accuracy of their fit, that as soon as steam was got up, it began to move with the utmost smoothness. Let the reader, we say, compare this splendid piece of work with the old Newcomen engine in the South Kensington Museum, and he will at once see the ages of mechanical genius we have traversed since Watt took the latter in hand, and by patient thought built up out of it the present steam engine. Yet it is not more than a century ago that the machine represented the most powerful motive engine we possessed, and was as fair a specimen of work as the eighteenth century could turn out. Such are the differences that have been brought about by half a dozen able men carrying out the traditions handed down by Henry Maudsley—mere workshop traditions, which now are acted upon throughout Europe wherever the machinist's skill is known.—*Forge and Lathe.*

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### Removal of Iron Coloring from Liquors.

A correspondent of the London *Chemist and Druggist* asks how to "remove the taste and color of iron from whisky, a piece of iron having unfortunately dropped into a large bulk and spoiled it all." The editor remarks: "We are surprised that the whisky attacked the iron; when of good quality it is not likely to do so. The most effectual way of getting rid of the impurity is redistillation. This would remove every trace of it, and at the same time improve the spirit. If distillation is not feasible, filtration through silicated carbon will perhaps take its place." In regard to the above we may say that, in this country at least, many spirituous liquors (excepting 95 per cent alcohol, which is always kept in glue-lined barrels) are not unfrequently spoiled by the accidental intrusion of iron, such as nails, or by carelessness in leaving them in contact with tinned iron liquor pumps or measures. This, however, does not go to prove the inferior quality of the liquor, the discoloration being due to the following cause. The spirits having been kept for a time in barrels (usually oak) gradually extract more or less tannin from the wood, and hence when a piece of iron is introduced they become more or less inky in appearance, if not in taste. In the case of alcohol of low proof, or what in this country would be termed common corn whisky, redistillation would prove effectual and, as the editor of the *Chemist and Druggist* remarks, serve to "improve the spirit;" but with the finer whiskies and brandies used as beverages, such a proceeding would manifestly prove impracticable, as would filtration through any substance whatever.

The following method, not generally known, will be found an effectual remedy in cases of this kind. If a quantity, say forty gallons, of liquor has been spoiled, take one quart of plaster of Paris, and having incorporated with it sufficient water to make it of the consistency of cream, pour the mixture into the barrel of spirits and mix very thoroughly by agitation. This done, allow the barrel to remain undisturbed for a short period, say a week. At the end of this time it will be found that the plaster of Paris has subsided, carrying down with it all of the inky coloring matter, as well as having removed the chalybeate taste. By this simple and harmless method, the finest liquors, although apparently irretrievably ruined, may be restored to their normal condition.

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### The Utilization of Iron Slag.

The *Chemical News* notes the exhibition, at the Paris Exhibition, of the products of a new industry in connection with the utilization of slag from iron blast furnaces. Before a method was discovered of converting this substance into what is known as "mineral wool," many attempts had been made to utilize this product, which covers so many acres of once fertile ground in the iron districts. As it is, it is generally considered as so much waste; it has been broken up for road paving, or made into blocks for building purposes, but as the product will not pay for its own transport, only a small quantity can be employed, and that only in the neighborhood of iron works. Several persons have tried making glass of it, and have succeeded by adding the constituents that were wanting; but to get the slag to a condition in which the matter can combine, it has to be liquefied by heat, which involves a very great expense. After many experiments, Mr. Britten has succeeded in utilizing the material, and also the heat from the furnaces, and an English company has been formed to work his patent. The company has erected glass works in Northamptonshire, close to a set of blast furnaces, and they are now in operation. The slag flows into a tank at one end, and is there mixed with the required ingredients for making the glass, fused, and fined; the melted metal then flows through a bridge to the other end of the tank, where it is worked, and afterward blown into bottles, etc. As the slag is already melted, it does not require so great a heat for the combination with the other substances, and also it furnishes more than half the material of the glass. Thus this glass costs less than that made by the ordinary method. The natural tint of the product is greenish, but it can be bleached or colored at will. The furnace now at work produces ninety gross of bottles a day. It can readily be seen that it will be cheaper for ironmasters to have glass works attached to their own works, as the cost will not be so much as the always increasing cost of ground to dispose of their slag on.

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### Relative Cost of Coal Transportation by Water and by Rail.

The increasing importance of the coal importations into London is causing a renewal of the struggle of 1871 between the railroads and steam colliers for the transportation of it.

In their ineffectual attempt in 1871, the roads lost at the rate of £300,000 per annum, and, from testimony given before a Parliamentary Committee, cannot hope to do much better in the threatened contest without the government interference which they seek. The manager of one of the largest coal lines to London states, in his evidence, that "he cannot carry coals any cheaper than from 0·020*d.* to 0·024*d.* per ton per mile," exclusive of trucks, while coal via Boston, by screw collier, costs under 0·006*d.* per ton per mile.

In the face of these figures it is hardly possible that the railroads will ever get the advantage over water transportation, no matter to what extremes they may attempt to urge legislation.

That the matter is worth fighting for, however, is shown by the statistics of the London Supply, which, in 1871, had grown in a few years from 1,000,000 tons to between 6,000,000 and 7,000,000 tons, and is now, in 1878, 9,000,000 tons.

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### New Agricultural Inventions.

Mr. Nelson E. Allen, of Beaver Dam, Wis., has patented an improved Sheep Rack, from which the unconsumed feed or hay which the stock will not eat may be discharged by tilting one or both of the racks proper. The racks may be so placed as to exclude sheep and other stock from the trough while grain is being placed in it.

An improvement in Cow Milkers has been patented by Mr. Slaughter G. Major, of Haynesville, Mo. It consists in an instrument for insertion in cows' teats, which allows the milk to flow out, thus avoiding the slow and tedious process of forcing the milk out with the hands.

An improved Reciprocating Churn has been patented by Mr. James E. Gibbs, of Scottsborough, Ala. This churn has a double dasher, that is reciprocated by means of an elliptical cam secured to the fly wheel of the driving apparatus.

Mr. James L. Carpenter, of Vineland, N. J., has patented an improved Device for Feeding Young Pigs, Lambs, Goats, and Calves. It consists in the combination, with a box or pen, of a receptacle for milk or other food, placed upon the outside of the pen, and provided with a series of nipples which project through the side of the pen to its interior. A trough is placed beneath the ends of the nipples to catch the drip and teach the animals to drink.

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### The Medical Ice Hat.

Mr. Spencer Wells, in his lecture on the diagnosis and treatment of abdominal tumors, states that, as a means of lowering temperature in cases when it has risen after ovariotomy, he has tried aconite in small doses, quinine in large doses, salicylic acid in the form of salicylate of soda, in fact almost every medicine that has been suggested as effecting this purpose, but all these trials have ended in disappointment. He has, however, succeeded distinctly in lowering temperature, and in keeping it low by the application of ice or iced water to the head. The first trials were made after a suggestion of Dr. Richardson, by putting an ice bag round the neck. Dr. Richardson believed that by icing blood that went through the carotids to the brain, and blood that came back through the jugulars, we should directly lower the temperature of the brain itself; and probably it may have been done experimentally, but in practice it was not found easy to do. It was difficult to keep any kind of cravat or collar that was tried, filled with ice, round the neck of the patient; it slipped off, and the old India rubber bag or ice helmet, so well known in lunatic asylums, had to be resorted to. After a time Mr. Thornton combined a particular form of cap which answers the purpose extremely well.

A pail of water with a large lump of ice in it is placed above the bed of the patient, and the stream of iced water runs through the cap, which is formed of a coil of India rubber tubing lined with linen. That is placed upon the patient's head, and it is made of different sizes and shapes to fit the patient; the other extremity of the tube is put into a second pail at the side of the bed, and by this means the head is iced. The effect in lowering temperature is very marked, the thermometer in almost all instances indicating a fall of temperature within an hour. If the temperature be rising it is checked, and if very high it can be lowered, and so time is gained for the recovery of the patient.