

Grape sugar or glucose can be made to substitute part of the malt, and is very commonly used for this purpose; in some cases to fully one-fourth the weight of the malt. Lager beer is usually stored from four to six months:

2. "Schenk," winter, or present use beer:

Water.....	1 barrel.
Malt.....	2 to 3 bushels.
Hops.....	1 lb.
Yeast.....	About $\frac{1}{2}$ pint.

It is ready for use in from four to six weeks.

3. "Bock" beer, an extra strong beer, made in small quantities and served to customers in the spring, during the interval between the giving out of the schenk beer and the tapping of the lager. In its preparation are used:

Water.....	1 barrel.
Malt.....	$3\frac{1}{2}$ bushels.
Hops.....	1 lb.
Yeast.....	About $\frac{3}{4}$ pint.

Bock beer requires about two months in its preparation.

Starch, grape sugar or glucose, glycerine, and molasses are not unfrequently introduced into beers to replace part of the malt, while pine bark, quassia, walnut leaf, wormwood, bitter cloves, aloes, etc., are sometimes used to neutralize acidity or conceal dilution.

The color of the beer depends much upon the care with which the malt is handled and the temperature with which it is kiln dried. 90° to 100° Fah. produces pale malt; 120° to 125°, amber malt. At temperatures above this the malt becomes brown, and the wort produced from it has a similar color. The malt should be dried so that every part of it becomes crisp.

TO MAKE AND MAINTAIN A LAWN.

Nothing gives a greater charm to a country home than a nice lawn. Its soft green is a delightful relief from the bright glow of the sun and the reflected light of summer skies. To secure it requires considerable pains at the outset, and constant painstaking thereafter, but the owner will be amply rewarded for his labor and trouble.

The preparation of the soil must be thorough, as it is the very basis of success. If there be a good natural clay subsoil, with a covering of loam, this part of the work will prove comparatively easy; but if, as is often the case in newly improved grounds, there is only the bare clay to begin with, or if the subsoil be a leachy gravel, the task of preliminary preparation is not light.

Suppose the plat to be a bald piece of clay from which, in the grading, every vestige of the superficial soil has been removed. If beds of rich loam are at hand and available, the loam may be carted upon the plat to a depth of from eight to ten inches, and leveled by thorough harrowing and rolling. If good sods are convenient, small lawns may be made by sodding, in which case a depth of three or four inches of loam upon the clay, underlining the soil, will be sufficient. If suitable loam is not attainable an artificial soil may be made. The clay should be plowed when moist, or spaded into clods and allowed to bake in the sun till the lumps can be pulverized. A heavy wooden mallet or beetle is a good tool for breaking the lumps. Upon the surface of the broken clay a layer of from three to four inches of screened coal ashes should be spread and thoroughly mixed in. The pulverizing and mixing should proceed together, for if rain should chance to fall on the clay after it is beaten fine it will again form a coherent mass. The mixture of clay and coal ashes will not compact like the raw clay. The ground so prepared should next receive a layer of two or more inches of well rotted manure, or from three to four inches of street dirt, which is better if it has lain in a heap for a year or so. The manure, whether it be from the stable or from the streets, should be thoroughly mixed with the pounded clay and ashes by forking if the plat is small, or by harrowing and cross-harrowing if large, and after seeding or sodding the surface should be well rolled.

Gravelly leachy soils are the worst for lawn purposes. It will be cheaper in the end to cart clay upon the gravel to make an impervious stratum, when clay can be cheaply obtained, superimposing a suitable soil upon the clay. No matter how thorough the preparation may be, a good deal of attention is required every year to keep lawns in perfect condition.

When weeds have made their appearance, as they are sure to do when animal manure has been used or when natural sods have been laid, they must be carefully removed; and to avoid their reappearance, the subsequent fertilizing should be by artificial fertilizers. We find in the *Boston Journal of Chemistry* a recipe for a lawn fertilizing mixture which commends itself to our judgment as being among the best:

Nitrate of soda.....	80 lb.
Superphosphate of lime.....	100 "
Rectified guano.....	200 "
Gypsum.....	120 "
	500

This amount is sufficient for one acre, and should be applied once a year, or twice on poor soils. The best time is early in the spring, after the snows have melted. It must be distributed evenly and with care. Those who have small plats of ground devoted to a lawn can readily estimate the amount of fertilizing material needed if they will measure the plats. The mixture of the materials should be as perfect as possible.

A mixture of 125 lb. nitrate of soda with 150 lb. superphosphate of soda, also makes a good top-dressing for an acre of land.

The substances named should be of prime quality to render the quantities named sufficient. The superphosphate of lime is very often adulterated. The nitrate of soda should not be less than 90 per cent pure.

These fertilizers will also renovate lawns when they have partially run out, and are considered by some as better than manuring with stable manure, turning it under and seeding again, a course which is enriching, but apt to disfigure the lawn with unsightly weeds. A top-dressing with stable manure will also renovate a lawn, but it also restores the weeds, and is offensive to sight and smell. Bone meal is a capital thing for a lawn. It is odorless, clean, and gives a rich green color to the grass.

Lawns should be mowed as often as once a week, leaving the short cut grass on the plat. The wilted cuttings protect the roots from the sun, nourish them, and help the soil to retain moisture.

A lawn which has a good clay subsoil will stand very dry weather, but there are occasional seasons when it is absolutely necessary to water artificially in order to prevent the appearance of unsightly yellow spots. On small lawns this may be easily done by a garden hose; large lawns may be watered by an ordinary street sprinkling machine having wheels with very broad tires to prevent cutting the turf. Just before nightfall is the proper time for watering. During the night the water will soak down to the roots instead of evaporating rapidly, as it would in the hot sun.

AN INTERESTING REGION.

In Western Pennsylvania can be found two regions utterly unlike in their industrial characteristics, and which at the same time cannot find duplication in the world. The oil region of the Northwestern part of the State, with its wells, tanks, and pipe lines, is unique in itself, but no less so than the more restricted area, in Southwestern Pennsylvania, known as the "coke" regions. From a strip of territory three miles in width and fifty in length is drawn the solid carbon which feeds blast and smelting furnaces from Lake Champlain on the east to Omaha and St. Louis on the west, and from Canada to Tennessee. At no time since the trade was founded, some twenty years ago, has there been such activity in the Pennsylvania coke regions as at present, hence an outline of the nature and peculiarities of the industry is not out of place.

The vein of soft coal from which the famous "Connellsville" coke is wholly made, is a magnificent deposit, well defined, and easily worked. Its average thickness is 11 feet, though but 8 feet is found adapted for coking purposes. This deposit is in the form of a shallow trough, preserving a parallel with the trend of the Allegheny mountain ridge and cropping out at its northern limit, at Blairsville, Indiana County, Pa. The southern limit is found near Morgantown, W. Va. Before referring to the extent of the trade it will be as well to state what are the peculiar virtues which win for this fuel so wide a market. Its elements of excellence are threefold, namely, great proportion of fixed carbon, freedom from sulphur, free open texture, strength of fiber, and ability to resist crushing pressure. The last quality renders it invaluable in furnaces charged with immense weight of ore or metal. An analysis of the best coke of the region gives the following: Fixed carbon, 89.80; ash, 9.44; bitumen and moisture, 0.52; sulphur, 0.24; total, 100.

The growth of the trade has recently, owing to the extension of railway shipping facilities, been rapid, and from a few hundred coke ovens in 1860, the industry to-day shows a total, in round numbers, of 6,000 ovens in active operation, and between 1,500 and 2,000 ovens in process of construction. Each active oven having a weekly capacity of nine tons of coke, the present output of the region is easily found to be $9 \times 52 \times 6,000$, or nearly 3,000,000 tons per year. The value of the article at the ovens is at present \$1.75 per ton, showing the year's output to be worth five and a quarter million dollars. Each oven represents an investment in lands, machinery, horses, cars, etc., the sum of \$800, and the value of the best coke-coal lands is from \$300 to \$500 per acre, the last figure being only obtainable for gilt-edged property, self-draining, and near to shipping facilities. To operate these 6,000 ovens requires an army of 10,000 miners, "drawers," drivers, etc. The process of coking is one of primitive simplicity. The freshly mixed coal, without preparation of any kind, is dumped into the opening in the apex of a "beehive" oven of fire brick, and of the following dimensions: Diameter at base, 12 feet; height in center, 8 feet; opening at apex, circular and 2 feet in diameter. A "charge" of coal is 100 bushels, covering the bottom of the oven to a depth of about 18 inches. No fire is applied, the heat from the previous charge serving to ignite the coal. The "coking" process goes on for 48 hours, a limited amount of air being admitted through temporary brickwork built in the arched doorway at the base of the oven wall. Two charges of "48 hour" coke and one of "72 hour" complete an oven's weekly record, the longer charge occupying the oven during Saturday, Sunday, and Monday, and the result being a harder and more desirable grade of coke. From the 100 bushels of coal, weighing 76 pounds per bushel, result 120 bushels of coke, weighing 40 pounds to the bushel.

To transport the product of this region is a rich prize for which the three great railway lines of the country are competing. The Baltimore and Ohio for a time enjoyed a monopoly by virtue of the nearness of the Pittsburg branch; the Pennsylvania Railroad, by a branch—the Southwestern

Pennsylvania Railroad—recently tapped the coveted trade; and still later the N. Y. Central, N. Y., Lake Erie and Western, and N. Y., P. and O. roads, by way of the Pittsburg and Lake Erie road, are found pushing forward toward this region of perpetual fire, sulphurous smoke, and fat freights. At present cars cannot be obtained as fast as desired, many coke firms being restricted to three days' shipments each week instead of six. Rates on coke are \$1.16 $\frac{1}{2}$ per ton to Pittsburg (50 miles), \$3.50 per ton to Chicago, and \$4 to New York. This is at the rate of \$14, \$42, and \$48 per car respectively.

Even to the stranger hurrying by rail through this part of Pennsylvania the region is full of interest, the ceaseless fires lighting up the rugged hillsides, and the smoke covering the land like a pall. This outline of the region would be incomplete without reference to a novel project just set on foot for utilizing the daily waste of 100,000,000 cubic feet of gas thrown off by the coke ovens. Two Pittsburgers, Messrs. R. H. Smith and C. C. Markle, have organized a company, applied for a charter, and also asked right of way through Pittsburg streets for their gas pipes. The gas will be brought from the coke ovens through a 24 inch main, 50 miles long, and furnished to consumers for heating purposes, also to the 971 puddling furnaces and 1,000 steam boilers of Pittsburg. By a system in which superheated steam plays a part, followed by washing, the projectors get a gas at the ovens rich in heating properties, but not suitable for illuminating purposes.

A NEW AMERICAN GEM.

At the last meeting of the New York Academy of Sciences, Mr. G. F. Kunz read a short paper upon the new mineral "hiddenite," discovered not long ago in North Carolina by Mr. Wm. E. Hidden, mineralogist. The mineral constitutes a new gem, of the emerald class, and is known in the trade as lithia-emerald, owing to the presence of lithia as one of its chemical constituents. We have seen some specimens of this gem, and they are indeed most beautiful objects to the eye. The stone has a pure delightful green tint with a liquid brilliancy that is quite distinctive and remarkable. It sells for about the same price as the diamond. Mr. Hidden tells us that the mineral is found in a narrow chimney in the rocks, not more than two feet long by two and a half inches wide, and having an inclination of almost seven degrees. We give a report of Mr. Kunz's paper in another column, and in our next SUPPLEMENT we shall publish the remarks upon the same subject by Prof. J. Lawrence Smith.

A Reporting Machine.

An interesting trial of a stenographic machine was made in the Chamber of Deputies, Paris, February 18, in the presence of M. Gambetta and a number of other officials and members. The mechanism, which is an Italian invention, is worked by a kind of key board similar to that of a small piano, and the stenographic signs, not unlike those used in the ordinary French short-hand, are automatically printed on a continuous ribbon of paper. The signs registered, of course, represent sounds, irrespective of spelling, and the machine can be used by a person unacquainted with the language spoken. The daughter of the inventor worked the machine successfully, taking down a speech read, at average speed, in Italian, and one read in French by M. Gambetta, she being ignorant of the latter language. A comparison between the speed of the machine and that of the short-hand writers of the Chamber proved favorable to the former. Further experiments will be made with a view to a possible adoption of the apparatus, which is already in use in the Italian Chambers.

The Arlberg Tunnel.

The preparatory operations having been finished, the work of boring the great tunnel through the Arlberg has now actually commenced. This tunnel will be one of the longest in the world, though not so long as that of St. Gothard. So far the operations on the eastern side of the Arlberg have progressed very favorably. The rock there found is a micaceous slate, through which the contractors find it possible to advance at the rate of from three to four meters a day. On the western side, on the other hand, the advance of the tunnel is retarded and the operations frequently disturbed by the repeated downrush of large quantities of water. The contractors were warned before commencing the work that this was only to be expected. The geologists further advised that the tunnel should be carried through a lower stratum of rocks, which are of denser material and watertight, but their warnings were, unfortunately, disregarded.—*Swiss Times*.

Pulverized Coal in Furnaces.

The *Iron Age* learns that Messrs. Alexandre & Sons are making some very successful experiments at the Washington Iron Works with pulverized coal. The coal is blown into a furnace and burns freely with a strong heat, but the apparatus is being altered to secure still better results, after which the process will be practically tested on one of the Havana steamers. The coal is fed from a perpendicular funnel, and the air enters horizontally from the side.

L. B. Boomer.

Mr. L. B. Boomer, of Chicago, late President of the American Bridge Company, died in this city, March 6. A large number of the great railway and other bridges in Illinois, Iowa, Wisconsin, Michigan, and other Western States were built by him.