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No. 278,

For the Week ending March 26, 1881.

Price 10 cents. For sale by all newsdealers.

A NEW TRADE MARK LAW.

By act of Congress, July 8, 1870, provision was made for the registration at the Patent Office of all descriptions of trade marks; and by subsequent legislation some very peculiar, we might almost say savage, additions were made for the pursuit and punishment of trade mark infringers. Except as to these last features, the law for trade mark registration proved to be very popular; hundreds of applications were made, and the official rules and machinery for issuing trade mark certificates had become well established, when, on November 18, 1879, the Supreme Court of the United States, in the case of the U. S. *vs.* Steffens, and the same *vs.* Wittemann, to the public surprise, decided that the whole legislation respecting trade marks must fall, as being void for want of constitutional authority. The court held that a trade mark is neither an invention nor discovery nor the writing of an author within the meaning of the constitution; that no law made under the constitutional authority to issue patents was applicable to the registration of trade marks; that "if trade marks can be in any case the subject of congressional action, that action is limited by the constitution to their use in commerce with foreign nations, among the several States, and with the Indian tribes." Nothing of this kind appeared in the legislation as established, and it was accordingly declared void. The last Congress passed a new trade mark law—approved March 3, 1881—which is intended to avoid the objections raised by the Supreme Court against the former law.

The new law retains the principal features of the old but the inquisitorial provisions of the old law for the pursuit and punishment of infringers are struck out.

The new law provides that owners of trade marks used in commerce with foreign nations or with the Indian tribes may obtain registration, at the Patent Office, by paying an official fee of twenty-five dollars, and complying with such rules and regulations as the Commissioner of Patents may prescribe. The duration of the registration is thirty years, with right to renewal for thirty years more on payment of twenty-five dollars additional. Infringers are to be dealt with by the courts.

Persons who have obtained registration under the old law may apply for new regstration under the present law, and in such cases the money formerly paid in by the applicant shall be credited on the new application.

The new rules and forms for practice under the new law are now in course of preparation by the Commissioner of Patents, and will be duly promulgated. In the meantime all who desire to obtain registration, or who wish to have their old trade marks re-registered, are advised to consult with the proprietors of this journal, Messrs. Munn & Co., 37 Park Row, New York, who will promptly attend to all business thereto pertaining.

The full text of the new trade mark law, and also the new census of the United States (1880) by States and counties, will be found in the new edition of the SCIENTIFIC AMERICAN REFERENCE BOOK, now going through the press. Price 25 cents. To be had at this office and of all newsdealers.

THE ACTUAL COST OF MAKING ILLUMINATING GAS.

An investigation is going on in Philadelphia touching the management of the city gas trust, the gas works being owned by the city and operated by official trustees. A recent witness before the investigating committee was Mr. E. S. T. Kennedy, expert of the New York Mutual Gaslight Company. Mr. Kennedy said that this company manufactured last year 721,000,000 cubic feet of gas, 30 per cent of which was from wood, 30 per cent from Youghiogheny coal, and 40 per cent from naphtha. During the year the amount of gas got from a ton of coal (2,240 lb.) was 15,000 cubic feet.

The gas averaged 27 candle power, and the price charged was $2.25 per 1,000 cubic feet.

The present process with coal, wood, and naphtha was introduced in August, 1878. It deposits no lampblack, and no heavy oil beyond about 1 per cent, and that is so heavy that it is used to great advantage as a fuel in the works. To enrich coal gas, Mr. Kennedy said the method was to add a certain percentage of cannel coal to the common coal.

The gas is entirely free from smoke, and does not blacken a ceiling unless within three feet of the flame, when it scorches. With 120 miles of pipe the loss by leakage is about 8 per cent; it is called "unaccounted-for gas," and the amount of it is determined by deducting from the amount registered in the station meter at the works, the gas consumed in the public lamps, in the offices and works, and the amount of gas paid for by consumers. The average power of the gas from coal alone is about 16 candles.

In the Mutual Works there are three separate departments: for coal, wood, and naphtha. In the coal gas department the coal is brought into the retort room, and is charged into the clay retorts every four hours. That charge will weigh from 215 to 230 pounds. The retorts are set six to a bench, and in drawing the coal one-half of a bench is opened every two hours. As the gas comes off it ascends through a stand pipe to a hydraulic main, which receives a portion of the tarry vapors; the gas then passes off, is cooled, and goes through a double purifying process. It is then measured and stored in the holders. The labor is subdivided, so that there is an average of ninety-one one hundredths of a man to a bench. The average production of coke on a ton of coal is 70 per cent of the original weight of the coal, or a long ton of 2,240 pounds ought to produce 1,500 pounds of coke, or thirty-five bushels. That is the average and ordinary amount produced to-day by the Mutual Gaslight Company.

The average production of gas tar and ammoniacal liquor is 12 or 14 gallons per long ton. The product of ammoniacal liquor varies, some companies producing as low as 15 gallons and others as high as 40; the average would be about 30. The present price of coke is between 8 and 9 cents a bushel; from 2 to 2½ cents a gallon for tar, and about 1 cent a gallon for ammoniacal liquor.

A double system of purification is employed by the Mutual Company. First, with an iron mixture, and afterward with oyster-shell lime. There are two principal impurities to handle—sulphureted hydrogen and carbonic acid. The lime is used to remove the latter. After it becomes thoroughly charged it is treated to a process of Dr. Wilkinson, the result of which is a lime that does one third more work than any lime that can be bought, and at one half the cost of the new lime. The same quantity of lime has been used one hundred and fifty times, and the chemist of the company thinks it will go on forever. There is no depreciation in quantity or quality. They have been using this process for two years without any increase of the lime.

On the following day, after Mr. Kennedy had inspected the plant and processes employed at the Philadelphia gasworks, he took the stand again. In reply to the question: "What does it cost to manufacture gas?" Mr. Kennedy said:

"The average cost of gas per 1,000 cubic feet in the gasholder is 65 cents; that does not include the cost of distribution. That I consider a fair average price based upon present prices of material and labor. I say 65 cents; it may be a cent or two more or less. I will undertake the management of your gasworks and produce coal gas at the present prices of coal for 65 cents in the holder. My calculation is based upon 16-candle gas."

In reply to the question, "What does it cost your company to put gas in the holders under your processes?" Mr. Kennedy replied: "Less than 50 cents a thousand." The Mutual Company expect eventually, he said further on, to manufacture from wood and naphtha exclusively, when the cost would be from 35 to 40 cents.

LAGER BEER.

Lager beer, the beer of Bavaria (and the United States), is prepared by a slow process of fermentation from strong infusions of malt, barley, and hops and grape sugar or glucose. The beer is usually fermented in winter, as it requires a temperature of not more than from 40° to 50° Fah.; and in hot weather the rooms must be cooled by means of ice or ice machines.

This kind of fermentation is what is called sedimentary or under fermentation, in contradistinction to ordinary or surface fermentation—the scum or yeast collecting at the bottom instead of at the surface, so that the air has free access and the gluten is more completely converted into yeast. This *bottom yeast* is quite different from ordinary yeast, and has a tendency to induce the kind of fermentation by which it was produced.

The following is a brief outline of the process employed at one of the largest lager beer breweries in New York city:

The barley is placed in wooden cisterns, covered with water, and allowed to remain for two or three days in soak, the water being changed once in twenty-four hours. It is then allowed to drain, and is subsequently thrown out in heaps on stone floors, where it heats spontaneously and soon begins to germinate, throwing out rootlets and shoots and evolving part of its absorbed water—sweating. It is then spread out and the germination allowed to proceed for from six to ten days, until the rootlets become brownish; then spread and tossed about to cool and check the fermentation. It is then put into large brick ovens or kilns, at a temperature of about 125° Fah., to dry.

The barley is now malt. It is first crushed by passing between a series of large rollers, and next is transferred to the mash tubs, where it is stirred about with water at 120° to 140° Fah., and boiling is then gradually added until all is heated to about 170° Fah. The infusion or wort is allowed to stand until the suspended matters have settled, when it is drawn off, and a second wort is obtained by treating the residuum with hot water. The first wort is boiled with the hops, the second wort is then let in, and the whole is boiled for about four hours. It is then run into the cooler, where it is quickly chilled to between 44° and 50° Fah., by running over small pipes through which cold water is continually flowing. As soon as it is properly cooled it is run into the fermenting tuns, where it is mixed with one gallon of yeast for every 20 to 25 bbls. Fermentation continues for about 20 days. At first there is a heavy froth, which soon subsides, however, leaving the surface clear. At the end of this period it is racked off into hogsheads, the yeast remaining at the bottom of the tuns. These hogsheads are allowed to stand with the bungs open until a few days before the beer is put into barrels for use, when the bungs are driven in to accumulate carbonic acid for *life*. Three varieties of beer are made.

1. "Lager," or summer beer, is prepared from the following:

Water	1 barrel.
Malt	3 bushels.
Hops	1½ to 3 lb.
Yeast	About ½ pint

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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 ½ 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	3½ bushels.
Hops	1 lb.
Yeast	About ¾ 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 natura 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 × 52 × 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 $1.16⅔ 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 af 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.

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