

SCIENCE AND INVENTION.

Work of the World's Busy Brains in Discovering, Inventing and Creating.

DENATURIZING ALCOHOL.

The passage of the free alcohol bill makes of much interest all the processes which are being used in other countries for so treating alcohol as to make it unfit for drinking and still retain its usefulness for other purposes.

"I. Complete denaturization of alcohol by the German system is accomplished by the addition to every 100 liters (26 2/3 gallons) of spirits: (a) Two and one-half liters of the standard denaturizer, made of four parts of wood alcohol, one part of pyridin (a nitrogenous base obtained by distilling benzol or coal tar), with the addition of 50 grams to each liter of oil of lavender, rosemary, (b) one and one-fourth liters of the above standard, and two liters of benzol, with every 100 liters of alcohol.

"Of alcohol thus completely denaturized there was used in Germany during the campaign year 1903-4, 931,406 hectoliters denaturized by process (a), as described above, and 52,784 hectoliters which had been denaturized by process (b). This made a total of 26,080,595 gallons of wholly denaturized spirits used during the year for heating, lighting, and various processes of manufacture.

"II. Incomplete denaturization, i. e., sufficient to prevent alcohol from being drunk, but not to disqualify it from use for various special purposes, for which the wholly denaturized spirits would be unavailable, is accomplished by such methods as follows: The quantity and nature of each substance given in the prescribed dose for each 100 liters (26 2/3 gallons) of spirits: (a) 100 liters of wood alcohol or one-half liter of pyridin; (d) 20 liters of solution of shellac, containing one part gum to two parts alcohol of 90 per cent purity (alcohol for the manufacture of celluloid, or pyramoid, denaturized); (e) by the addition of one kilogram camphor or two liters of turpentine, or one-half liter benzol to each 100 liters of spirits.

DYED CHERRIES.

Those who are allured by the brilliant red cherries to be found in bonbons, candied fruits and cocktails will be a little disturbed to know that the brilliancy of this coloring is due to aniline dye, the use of which is general in France and everywhere recognized as a regular practice. The coloring matter is an aniline known commercially as "rose nouveau." So well recognized is the practice that our Consuls in France have no difficulty in getting all the details of the work from the manufacturers. The following are directions for coloring fruit:

"The fruit is selected, washed, stemmed and spread upon slat frames of wood, underneath which are placed basins of sulphur acid; the cherries are subjected to the fumes of the ignited sulphur until they are of a uniform color, which is usually yellow. The quantity of the coloring matter (rose nouveau) is dissolved in a liter of cold water. Then the cherries are placed in an earthen pot with a little of the coloring liquid and allowed to stand for a few minutes. The coloring matter is added, and the above process is repeated sometimes 15 or 20 times, or until the desired color is obtained and the glaze process finished."

The Bureau of Statistics says that imported during the last 11 months automobiles to the amount of \$2,502,244, while our exports amounted to \$2,957,748. The manufacture of the vehicles is growing amazingly, and the value of the automobiles manufactured in the United States in 1905 was about \$26,645,044. This is over five times the value of those manufactured five years before.

Comparison of Cost of Concrete and Stone Masonry.

(Scientific American.)

The cost of concrete and stone masonry varies largely with the local conditions, especially in the quantity of the material which is used; but there are very few places where concrete masonry is not only cheaper than stone masonry, but better, stronger and more suitable in many ways. This fact is becoming more generally recognized, and more than one quarry which in former years produced building stone is now producing concrete blocks and concrete. The following figures give a general idea of the comparative cost of brick masonry and concrete, per cubic yard:

Brick—500 brick, \$2.75; 1/2 barrel cement, \$1.50; 1/4 load sand, 50 cents; labor, 2.25; making a total, \$6.45.

A New Alloy.

Two parts of aluminum and one part of zinc form an alloy which has been given the name "aluzene." It is equal in strength to good cast iron and superior to steel in its resistance to corrosion. It takes a fine, smooth finish and does not readily oxidize. The color is white. It melts at a low red heat and is very fluid, running freely to the extremities of the mold. It fills the mold completely. Great care must be exercised in melting it, particularly when mixing the two metals, in order to preserve its smooth working quality. It is not so brittle as brass, and hence unsuited to such pieces as require the toughness possessed by brass. The tensile strength is approximately 22,000 pounds per square inch and 3.5 is the specific gravity.

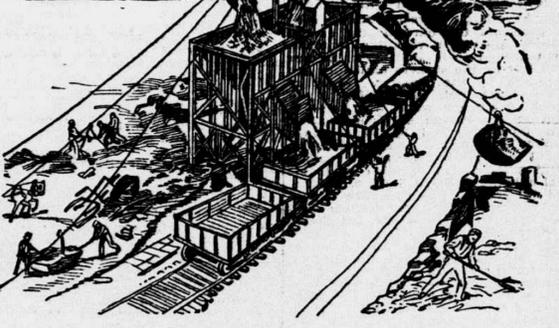
Chain in the Shop.

A good way to keep a file from filling up with the metal being filed is to rub it with chalk, especially if this is done in reducing a shaft by means of an oiler. Chalk makes a good oil extractor for both ends also. Rub the chalk into the file teeth, then pack the belt in the cap. The capillary action induced will draw the oil from the belt into the chalk, and enough will be removed to make the belt fit for service.

THE SAN FRANCISCO DEBRIS.

A Plan for Getting Rid of the Vast Accumulation of Debris That Cumber the Ground.

It is estimated that the mass of brick and other debris in the burned district of San Francisco aggregates some where between 10,000,000 and 11,000,000 cubic yards, and to remove this would require all the teams that could be put on the streets for five years. A plan has been developed to accomplish the work in 15 months. It is to erect bunnies at a convenient place throughout the burned district. The debris will be conveyed to these bunnies by cable ways, and from the bunnies it will be dumped on the beach. As is well known, permits for the laying



ONE OF THE HOISTING PLANTS AT SAN FRANCISCO.

of railroad tracks throughout the burned district has been applied. Five miles of tracks are being laid, and the work of laying temporary tracks to handle this business is now being rushed. The railroads are the only institutions that can handle this business.

Steam Locomotive Cheapest.

The average steam locomotive spends one-third its time, not in bed, but in having its boiler and firebox cleaned. There are exceptions, and in emergency the cleaning process is curtailed, but like other excesses, has to be paid for with a longer stay in the repair shop. The washing process does not consume all the time, for there is a great waste while waiting for the boiler to cool, and again in getting up steam.

An electric locomotive will stand a heavy overload, and will require no oil. Its normal will not heat and can be kept in operation almost continuously. The electrical repairs are easily and quickly made, as for the most part they are made by substitution. A supply of renewal parts being kept on hand, thus reducing the time in shop to the lifting out of one piece and putting back the new one, where a steam locomotive would require a day or more to pieces and the work done specially.

The advantage, however, is shown by the Railway Age to be misleading, for the reason that steam locomotives cost about \$10 per horsepower against \$100 per horsepower for an electric power station alone, or \$100 per horse power for the generating plant, transmission line and electric locomotive. The interest on the investment is therefore 10 times as much for the electric system, which more than offsets the extra steam locomotives require to allow one-third of the time to be used for the electric system. There are conditions, however, such as terminal and tunnel service in large cities, in which the advantages of the electric system determine its selection regardless of cost.

Destruction of the Ferris Wheel.

The great Ferris wheel, once the mechanical wonder of the world, was purposely wrecked with 200 pounds of dynamite at St. Louis on May 11. The inventor, for whom it was named, built it at a cost of \$1,000,000. It cost \$300,000 as a mechanical amusement device for the Chicago World's Fair and as a rival of the Eiffel tower. The wheel was 64 feet in diameter, and its shaft was the largest ever forged. There were 4,600 tons of metal in the structure. After earning \$750,000 it was taken down at the close of the Exposition and shipped to St. Louis. It was again taken down in 1903 and shipped to the St. Louis World's Fair. The inventor's company decided to take the most money in wrecking it for scrap valued at \$5,000, and fired 300 pounds of dynamite under it on the first charge. The wheel did not fall, but leaped to one side.

When the second charge was fired later in the day the huge monster did not fall on its side, as predicted, but first seemed to quiver, then to lurch, and finally to collapse. The action increasing until the great sections were bending and twisting like wire. Finally there came the final crash, which covered the foundations with a tangled heap of iron and steel. The wheel was designed on the principle of a bicycle wheel with a double rim of bridge construction. The shaft, weighing 100 tons, was driven 20 feet into the ground.

How Seeds are Put in Packets.

Should you purchase several packages of one kind of garden or flower seeds, put up by the same firm, and you will be surprised to find how uniform in quantity is each packet. This result is not accomplished by hand, but in the rapid work of an extremely interesting machine which is the invention of a Vermont.

A Great Reservoir.

The Feather River, in northern California, has a reservoir second only to the gigantic reservoir at Assuan on the Nile. A 300,000-horsepower electric power plant is to be formed by utilizing the power of the river to form a reservoir, which will be the largest of stupendous size. The power from these monster stations is expected eventually to run the railroads, light the towns and cities of the Sacramento Valley and around the Bay of San Francisco when the new city is built. The transmission lines are to be arranged in 175 miles long, and to be run on automatic switches will throw the current on the other.

A CURIOUS EXPERIENCE.

Surfman Stiles Struck by Lightning and is Told of It.

Many men have been struck by lightning and never knew what hit them. But it is not often that a man is struck by lightning and has to inquire afterward what happened. Yet that was the case recently with Walter Stiles, a surfman of the Townsend Inlet Life Saving Station down on the coast of North Carolina. In a report to the Department the story is told in a way that on the night of March 19 there was a severe storm and Stiles was one of the beach patrol. He left the station about 9 o'clock at night. Five minutes thereafter there was a severe clap of thunder and in about 20 minutes Stiles staggered in half dazed and asked what had happened. His hat was gone and he said he felt as though some one had wailed him and clubbed him on the back of the neck. Two of the patrol took a lantern and went out with him, following his back tracks in the sand. In a little while they found where he had fallen on the beach. He had not seen the lightning and

Out in Montana they are disposed to give the debris a ha! ha! to Senator Clark's announcement that he will not be a candidate for re-election. Those who know him best say that he is probably feeling the loss of the seat which lies nearest his heart is to stay in the Senate. His announcement was intended to disarm his numerous enemies in Montana, and to show that he was upon some one else. In the meanwhile his (legislative) men are canvassing the usefulness of the other candidates and working up a general alarm that the only man who can represent the State is its present Senator. The next thing is that it is doubtful which party will control the next Legislature. Should the Republicans have it, Clark would be a member of the House before the storm came. If the Democrats get it, why, then, he will be prepared to again turn loose enormous amounts of coal to secure his election. The Senator would have forbidden in secret alliance with Clark, because Carter does not want the present status changed, and would much prefer to be the only Republican Senator from Montana. The reason for this is that the Butte Miner, which used to be a deadly antagonist of Carter, staying its hand and treating him with marked gentleness, no longer says so. The Democrats carry the State, Clark will still have trouble in his own party, since the miners claim he played the traitor to them in going over to the Standard Oil company in 1901. The Standard Oil company is now a man of much ability. Our old friend, Maj. Martin Magnin, 11th Minn., is also a Senatorial possibility, and deserved more recognition than he has received in 1900. He is a man of record and his lifelong unquestioned Democracy. He cast his lot with the party when he first migrated to the State, and has been instant in season since 1891. He is a man of high character but got lean pickings for his loyalty. Everybody holds him in high esteem, but his bank account unfortunately is not of the size to put him into the running for the office.

Moss as a Popular Food.

Prof. Hansteen, chief lecturer of the agricultural school at Aas, Norway, has conducted experiments which show that a common greenish-white moss, after being subjected to a chemical process, pressed and cooked, becomes a food of the most delicious and nutritious character. It is destined to become a popular food for the masses. He finds that nine ounces of moss, costing two cents, will make a good dinner for a family of four. The substance can also be ground and used as a meal for bread-making.

Length of Working Day.

Most of the larger mines in Alabama are operated on a 10-hour day. Sixty-one mines employing 10,670 men, or, constructively, about half the total number, reported 10 hours as the length of the working day; 30 mines, employing 3,320 men, reported nine hours, and 14 mines, employing 1,960 men, reported eight hours. Three mines work their men nine and a half hours and two mines work them eight and a half hours.

Oyster Planting in Pacific.

The native oyster found on our Pacific coast is extremely small—about one-fourth the size of an Atlantic oyster. Many carloads of Eastern oysters have been shipped to the coast of California and along the California coast. Some of the beds are just commencing to produce, one of them affording 700 sacks per day the past winter. The longer the season lasts, the more oysters, from \$6 to \$12 per day.

Coloring Shellac Varnish.

To color shellac varnish black, add lampblack; for red, use Chinese vermilion; for blue, use Prussian blue. A very good quality of blue cannot be obtained. Have all coloring matter dry and finely pulverized. To mix, add the coloring matter to a little of the varnish and work to a smooth paste. Then add varnish and alcohol if necessary, in proper quantity to make the mixture spread nicely.

Insulating Rosewood Stain.

Put 1 1/2 pounds logwood chips in a gallon of water and boil until reduced in volume to two quarts. Apply boiling hot, and if several coats are necessary, let each coat dry before applying the next. Grain the finished surface with fine sandpaper, and take a logwood infusion containing the sulphates of iron and copper.

For Cleaning Old Brass.

A good formula for cleaning old brass is as follows: Take an ounce of oxalic acid, six ounces of rottenstone, half ounce of gum arabic, all in powder; one ounce sweet oil, and sufficient water to make a paste. Apply a small portion, and dry with a piece of flannel or soft leather.

Oil Finish for Wood.

A good, durable finish for wood can be obtained by soaking the article in linseed oil for a week and then rubbing with an oil-silk. The oil should be renewed each day for about two weeks. This solidifies and preserves the work, and gives a much more durable finish than French polishing.

Science Notes.

When filling nail holes in yellow pine use beeswax instead of putty, as it matches the color well.

Good for the American Soldier.

A characteristic instance of the efficiency of American private soldiers is given by Col. Peabody, says a San Francisco dispatch to the New York Sun. One of the first days after the earthquake he found three private men who had organized a regular relief system on their own initiative down at North Beach in the Latin quarter. Privates F. P. McGarry, William Ziegler and H. J. McConry were on leave of absence at the time of the disaster. Finding themselves among the destitute, Italian immigrants, they thought of things without formalities. They closed saloons and took possession of stocks in corner groceries. The supplies which they had had commandeered they distributed among the Italians, who were guarded them with favor and obeyed their commands with promptness that was inspired by affection. They ran the saloons and groceries until the machinery of regular relief was going.



Capt. Thomas C. Cowgill, who served as Captain in the 95th Ohio and four terms in the Ohio Legislature, died from typhoid at Urbana, July 5.

Mrs. Susan M. Wyckoff, widow of Gen. Charles A. Wyckoff, U. S. A., who was killed at Cuba during the Spanish-American war, died at her home in Easton, Pa., July 1.

Col. Frederick Ledergerber, who served in the 12th Mo., and was a lawyer for many years in St. Louis, died July 5, at the Soldiers' Home at Danville.

Senator Chauncey M. Depew is said to be the picture of despair and the victim of brooding grief. He is hidden away in a pleasant country home in Westchester County, not far from the cliff Manor, where he presents the picture of a feeble old man sunning himself lazily on the broad verandas of the house. The doctors say it is a case of nervous prostration and have forbidden him to read the papers or take part in any discussions. He is surrounded by friends who try to cheer him up and the only Republican Senator from Montana. The reason for this is that the Butte Miner, which used to be a deadly antagonist of Carter, staying its hand and treating him with marked gentleness, no longer says so. The Democrats carry the State, Clark will still have trouble in his own party, since the miners claim he played the traitor to them in going over to the Standard Oil company in 1901. The Standard Oil company is now a man of much ability. Our old friend, Maj. Martin Magnin, 11th Minn., is also a Senatorial possibility, and deserved more recognition than he has received in 1900. He is a man of record and his lifelong unquestioned Democracy. He cast his lot with the party when he first migrated to the State, and has been instant in season since 1891. He is a man of high character but got lean pickings for his loyalty. Everybody holds him in high esteem, but his bank account unfortunately is not of the size to put him into the running for the office.

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ARMY OF THE CUMBERLAND.

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