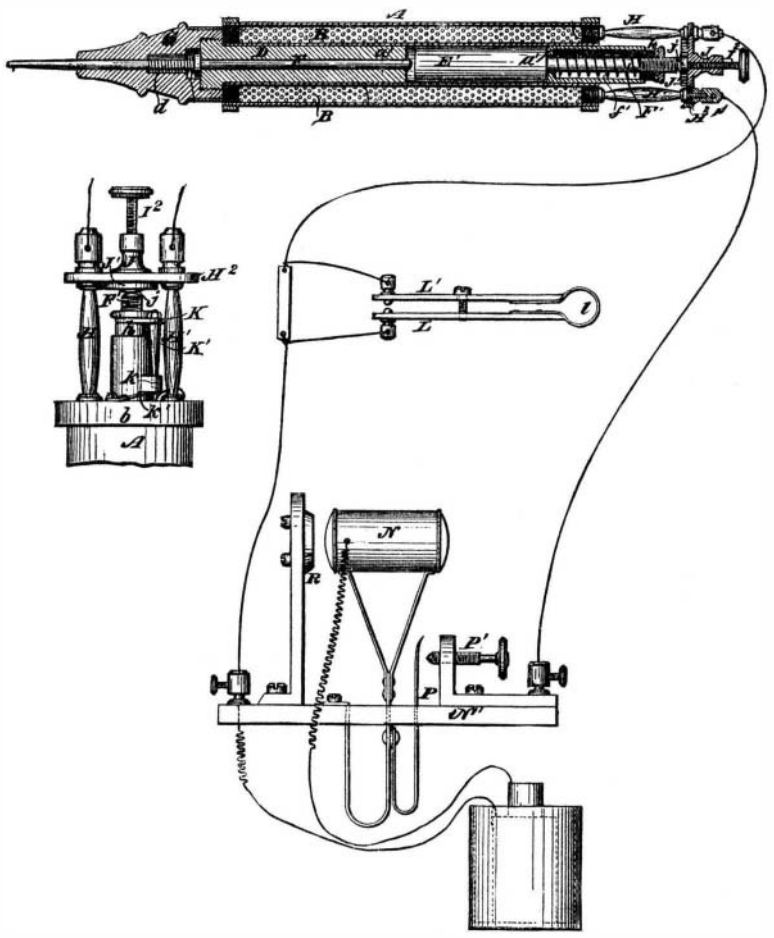
TWO NEW DENTAL INVENTIONS.

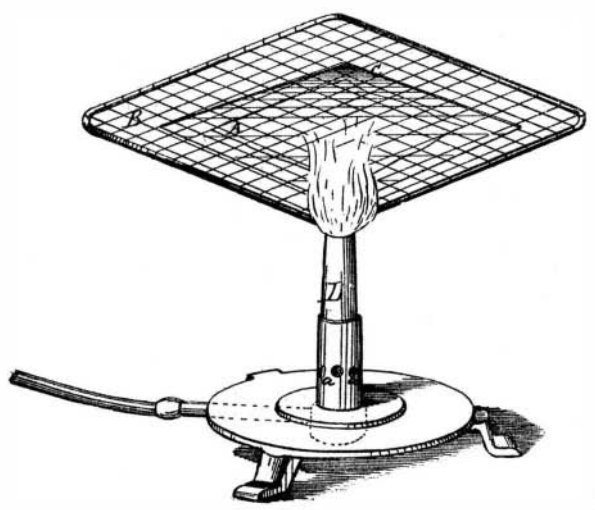
A very ingenious electric plugger, in which the circuit can be established or interrupted at will, has been patented (March 21, 1876) by Dr. Allen Spencer, of Columbus, Ohio. The mallet hand piece, composed of an inner tube, is mounted in a casing. The wire of the helix is confined in the handle, and passes through the butt cap, and connects with the battery. Armatures, formed of two cylindrical cores of soft iron, are mounted in the inner tube. The core, D, is fixed, and the core, E′, movable endwise. A metallic rod plays through the fixed core; and, by the spring, *d*, pressing on a shoulder, is forced slightly beyond the inner end of the core, D, so that it may be acted upon by the movable core, E′. A tool holder is attached to the outer end of the rod, F, for the insertion of different plugger points. The movable core is pressed against a collar, *a′*, by a spiral spring, *j′*. This spring surrounds a neck, F′, and bears at one end upon the collar, *a′*, and at the other against a non-conducting ring. Two posts, H H¹, are screwed into the butt cap, and connected by a crosshead, H². A set screw, I², projects against a disk, *j*, of soft iron, around which, and between the posts, H H¹, is coiled a thin band spring, J′, of copper. One end of the spring is connected to the disk beneath the plate, and the other end to the post, H. A collar, K, on the neck of the movable core carries an insulated break, consisting of a rod, K′, of wood, which acts on a plate spring, *k′*, secured at one end in the butt cap, *b*, by a screw communicating with one end of the helix wire, the other end of the helix wire being connected with the insulated post, H¹. The outer end of the spring, *k′*, abuts against the guide, *k*, which forms a contact stop. A simple circuit break or key, which may be operated by the mouth, or preferably by the foot, is connected with one of the battery wires, sufficient length of wire being employed, as shown, when the key is used, to admit of its ready manipulation by the operator. It is composed of two rubber sides, L L′, connected by a spring, *l*, at the rear, so as to admit of the sides of the key being pressed toward each other at their outer ends.

In operation, the armatures, D E′, being magnetized, the sliding one, E′, carries down the disk, *j*, until the endwise-moving break rod, K′, strikes the spring, *k′*, breaking the circuit and interrupting the current at the same time that the hammer-like stroke of the moving core upon the shaft, F, operates the plugger point. The cores being demagnetized by the breaking of the circuit, the moving one is quickly returned by its spring, *f′*, to its normal position, closing the circuit; and the shaft also, at the same time, is protruded beyond the end of the fixed core, D, retracting the plugger point with it. The above operation is repeated and continues as long as the break key closes the circuit. In this way the operator has complete control over the instrument. The battery is, by preference, provided with a vibrator to cause the current to pulsate. The vibrator is shown as mounted in a cylinder, N, supported upon the battery cover or box, N′.

When the connections are all made and the vibrator is started by hand, the motion becomes self-sustaining because of the impulse given the spool magnet by its attraction toward the disk, R, at every pulsation of the current; and as the pulsations pass by the wires through the cores, D E′, of the mallet, they become magnetized, and the plugger point strikes its blow. The speed of the pulsations is controlled by the thumbscrew, P′; when the screw is set toward the spring, P, the vibrations are more rapid, and when set further off they become slower. The set screw of the vibrator serves also to regulate the force of the blow by determining the instant at which, with reference to the stroke of the mallet, the circuit shall be broken; whereas the set screw, I², of the automatic break, serves merely to regulate the frequency of the blows.



SPENCER'S ELECTRO-MAGNETIC DENTAL MALLET.



WILLIAMS' METHOD OF MANUFACTURING DENTAL FOIL.

Another new invention relating to dental manipulation is a means of covering foil with a coating of carbon to render it more easily worked without becoming adhesive.

Heretofore, non-cohesive or soft foil has generally been made by imperfectly refining, and by leaving traces of silver, copper, and iron, which cause it to be somewhat stiff and liable to discoloration in the mouth. In order to produce a foil for dentists that can be absolutely pure, and which, even when freshly annealed, does not stick at all or only slightly, when rolled up or manipulated. Dr. Richard S. Williams, of New York city, takes the sheet of foil, A, places it upon a wire gauze, B, and, with the aid of any suitable flame, causes a slight deposit of fine carbon upon the surface of the foil. To prevent the ascending current of heat from the flame from displacing the foil when laid on the gauze, a sheet of mica, C, is placed upon it. With a Bunsen gas burner, as shown at D, the amount of carbon to be deposited may be readily regulated by stopping up one or more of the air passages, *a*, of the burner. The less air admitted, the greater will be the deposit of carbon, and *vice versâ*. This invention was patented January 25, 1876.

Artificial Vanilla made from Wood Tar.

It appears that the series of dyestuffs which may be obtained from tar is by no means exhausted; while another large and equally important class of substances, also obtained from tar, is daily increasing: substances not intended to please the eye, but for the nose and mouth, namely perfumes and flavors. The manufacture of salicylic acid from carbolic or phenic alcohol opened the prospect of a cheap manufacture of great numbers of various flavoring principles, which had been commenced by the nitro-benzole or so-called oil of mirbane, which perfumers use in place of oil of bitter almonds. Soon benzoic acid and oil of wintergreen or *gaultheria* were produced, and then many closely related flavoring principles; and now it has been proved that vanilla flavor can be made artificially from one of the tar products.

According to the German *Industrie Blätter*, Reimer reported to the German Chemical Association that he had made from beechwood tar. first oil of guaiacum, and from this vanillin, the flavoring principle of the expensive vanilla bean. He obtained this by searching for a common reaction of the various phenols or carbolates (the creosote-like constituents of all tars) by which different aromatic aldehydes are formed from each.

When phenol or carbolic acid is mixed with chloroform and an excess of a caustic soda solution, and proper time for reaction is allowed, the unchanged remainder of the chloroform must be removed, and replaced by an acid; then an oily aldehyde of salicylic acid will be separated, which may be purified by combination with bisulphite of soda, and decomposed by some diluted acid. Oil of guaiacum, treated in this way, produces (as mentioned) vanillin, which is the aldehyde of vanillic acid.

Marasse, who several years ago found the oil of guaiacum in the creosote of beechwood tar, observed then that this body smells agreeably like vanilla, a smell which is also peculiar to guaiacum wood (*lignum vitæ*, iron wood) and its resin, out of which the oil of guaiacum was first made in 1826 by Unverdorben.

It is to be expected that, out of the numerous carbolates at present known, by applying the reaction discovered by Reimer it will become possible to produce artificially many other natural flavors, hitherto only obtained in an expensive way.

A NEW copper paint is made in Paris from porous copper deposited by the galvanic battery mixed with a varnish. The solvent of the varnish is benzine. The copper is very pure and is easily pulverized, and, when mixed with the benzine varnish, may be applied to iron, brass, plaster, or wood. When mixed with oils, the copper acquires an antique green hue.

A New Smoke Consumer.

The Pittsburgh *Chronicle* says: There has recently been introduced in Zug's Sable Iron Mills a smoke-consuming apparatus, which certainly accomplishes all that can be desired. It would be hard to conceive anything more simple in its construction and operation. A one half inch steam pipe runs along the forward wall of the furnace, some 20 inches above the grate bars. From this transverse pipe project inwardly a number of short pipes, terminating in a small orifice. Each of these pipes is surrounded by a sleeve of larger pipe, 1¼ inches in diameter. The annular space between the interior of the larger and the exterior of the smaller pipes communicates with a flue, opening into the outer air at the side of the furnace. When a pressure of 20 lbs. per square inch has been attained, steam is turned into the smaller pipe. Its escape from the orifices acts upon the air-filled annular space, much as the steam in the Giffard injector does upon the feed water, and, drawing it rapidly through the pipe, projects air and steam into the furnace. The heat of the fire decomposes the steam, and at the same time the carbon-laden smoke is utterly consumed and converted into a bright, clear flame that lights up the interior of the furnace. This operation is observable through a mica door in the rear of the furnace. Fixing the eye on the top of the smoke stack, and noting the moment when steam is turned into the consumer, the inky torrent of smoke is first seen rolling skyward. With the hiss of the escaping steam these clouds are dissipated, like fog before the sun, and in a few seconds only a faintly depicted vapor is wreathing upward from the stack. The engineer states that the decrease in consumption of fuel amounts to 20 per cent since the introduction of the consumer. The boilers are of the Wiegand pattern.

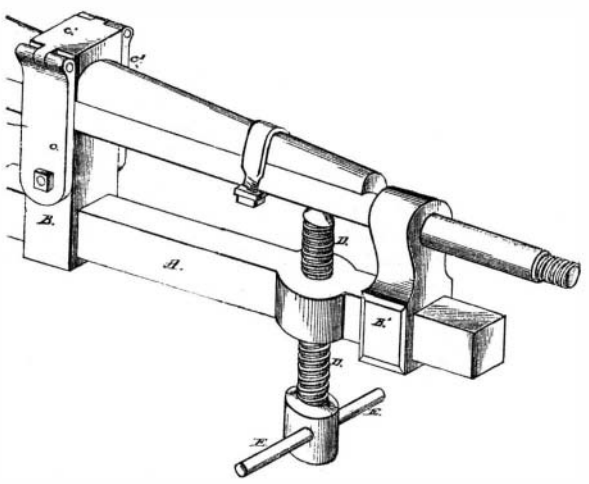
Setting Milk.

Mr. L. S. Hardin, of Louisville, Ky., has recently made a series of experiments regarding the setting of milk. He states that deep setting accompanied with refrigeration is the best plan. The milk is placed in cans from 12 to 20 inches deep and 8 in diameter. These are put in a refrigerator box, with a shelf in the top, upon which ice is placed, and the temperature is reduced below 50°. The milk is skimmed after 36 hours. The cream is churned at 58° in warm, and at 63° in cold weather. The butter is said to be of superior flavor and aroma, uniform in quality, and to keep well; and a greater weight is obtained from a given quantity of milk with less labor and less cost than by other methods.

APPARATUS FOR SETTING METAL AXLES.

We illustrate herewith a new apparatus by means of which the axles of wagons, carriages, and other similar vehicles can be straightened or set, should they happen to become bent out of shape, without removing them from the body of the vehicle.

The bar, A, supports two heads, B and B′. The head, B, is adapted to slide upon the bar, A, and has attached to it a hinged yoke, C, consisting of three parts, *c*, *c*¹, *c*². The part, *c*, is secured at its lower end to the head, B. To the upper end of said part, *c*, is hinged one end of the part, *c*¹, the upper side of which may be curved to conform to the shape of the upper side of the axle, if desired. To the other end of the said part, *c*¹, is hinged the part, *c*². The head, B′, is adapted to slide upon the bar, A, and is provided with an aperture or eye by which it can be fitted over the end of the axle of the vehicle. Between the two heads the bar is enlarged and provided with a screw thread aperture, which is fitted with a powerful screw, D, provided with a lever, E, at one end, by which it may be turned, and having its other end rounded off to form a proper bearing surface against the axle while in operation. The operation is as follows: The wheel is removed from the axle to be straightened, and the bar placed longitudinally beside said axle in proper position to



bring the end of the screw to bear in the required place. The heads are then adjusted and secured, the head, B, being passed under the body of the vehicle, the hinged yoke passed over the axle and fastened to the head, and the head, B′, being simply passed up on to the end of the axle. The screw is then put into operation and made to bear upon the axle until it assumes its proper shape. Patented December 21, 1875, by Mr. Frederick Bex, of Washington, D. C.