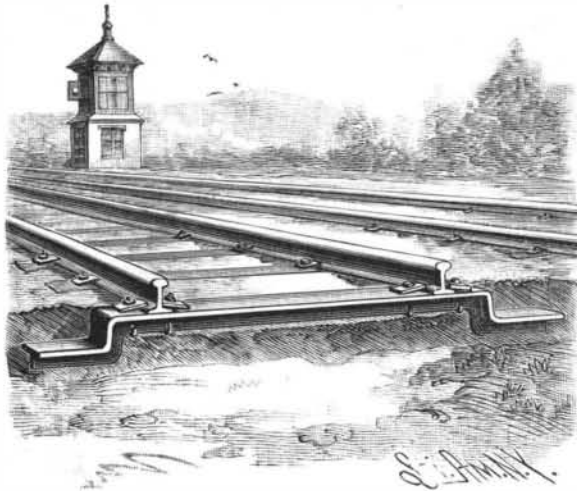


AN IMPROVED METALLIC RAILROAD TIE.

A railroad tie designed to be made of iron or steel, which can be inexpensively made, and is calculated to give great stability, is shown herewith, and has been patented by Mr. Charles Netter, of No. 131 Water Street, New York City. It is formed by rolling the iron or steel into the form of a straight bar having a T section, and then bending the bar near its opposite ends, a little beyond the line of the track, to make

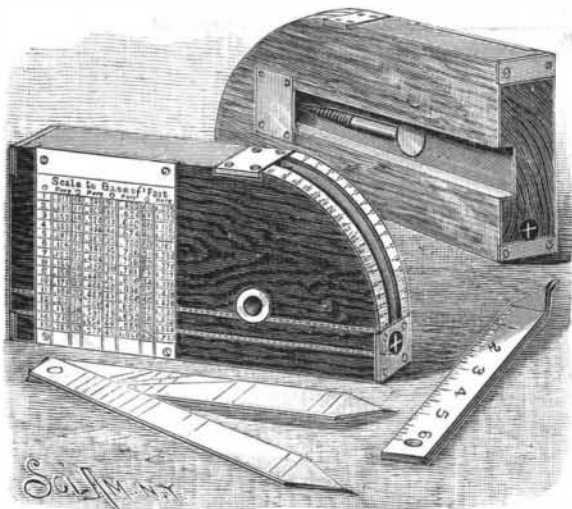


NETTER'S METALLIC RAILROAD TIE.

portions depending at right angles and further portions projecting horizontally outward. The tie is buried to bring its top plate on the surface of the track bed, by which it will be anchored to prevent further sinking, the vertical end portions preventing endwise movement, and the horizontal extensions thereof preventing lifting, while the central longitudinal flange resists movement longitudinally and acts as a rib to stiffen the tie. The rail may be fastened by passing a hook bolt through an aperture formed in the top portion of the tie and slipping the hooked end of the bolt over the lower edge of the flange, drawing an ordinary clip plate down upon the base of the rail by means of a nut screwing on the upper end of the bolt.

A COMBINED LEVEL AND RULE.

An instrument applicable in many and various ways, as for leveling and obtaining horizontal and vertical



WICKHAM AND ROACH'S LEVELING INSTRUMENT.

angles, is illustrated herewith, and has been patented by Messrs. Almeron W. Wickham and James M. Roach, of Burnside, Conn. The block, which constitutes the main body of the level, has in its forward end a tube bent to the form of an arc, and five or ten degrees longer than a quadrant, being divided into degrees from 0° to 90°. In the back of the block is a groove adapted to receive a folding rule, there being also a recess in the groove to hold a screw-pointed pin, to be used for holding the level upon a tree, post, or other proper surface, by passing the pin through an aperture shown in the block, and bringing its screw-threaded end into engagement with the support. A longitudinal bore parallel with the bottom of the block has crossed wires in each end, the bore to be used for sighting, and to the face of the block is secured a plate which gives the scale of perpendicular of any angle up to sixty degrees. The rule is formed in two sections, connected by a pivot pin, one face of the rule being divided into inches, while the other is marked with angle lines, so arranged that when any two lines formed upon the two rule sections are brought together and form a straight line, the numbers placed in connection with the two meeting lines will indicate the angle at which the two lengths of the rule are extended. The free ends of the rule sections are pointed, so that the rule may be used

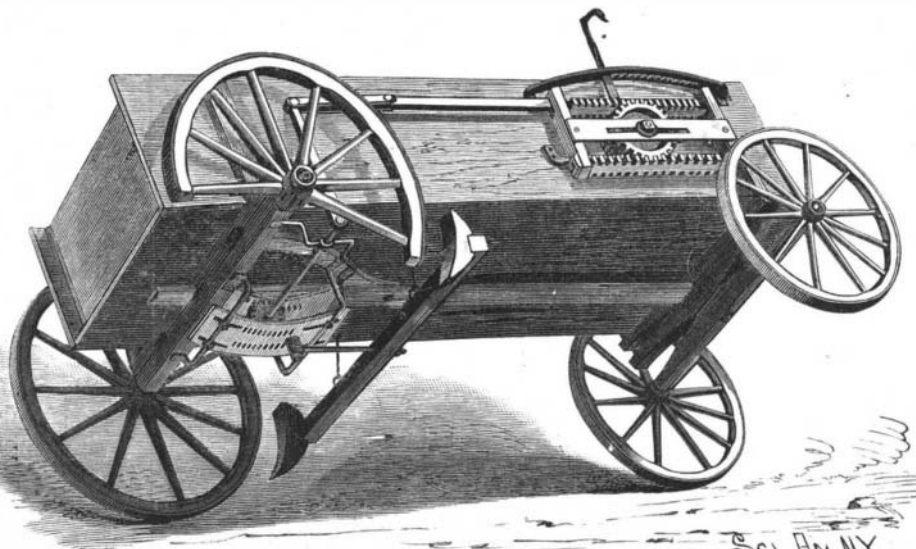
as dividers. By means of this level the heights of trees, houses, etc., from any given level can be found, and the instrument is designed to be a convenience for mechanics and artists as well as for architects, surveyors, and engineers.

A New Acid—Peculiar Properties.

Mr. David Hooper, F.C.S., of Ootacamund, India, has extracted a new acid from the leaves of the plant known to botanists as *Gymnema sylvestre*. It is a plant of the family of Aselepiadiæ, which grows in the Decan Peninsula, Assam, and Africa, and it was found that on chewing its leaves, all sense of the sweet taste of sugar disappeared as if by magic. For instance, if gingerbread were eaten, only the taste of the ginger was perceived; if a sweet orange, only the acid flavor of the citric acid, and the orange seemed as sour as a lime or a lemon. But what is still more curious, not only the sweet taste of substances containing sugar is effaced, but bitterness is also destroyed at the same time. Hence if a person takes sulphate of quinine after chewing the leaves of the *Gymnema*, it merely tastes like so much chalk or plaster of Paris. The effect in question lasts, as a rule, for one or two hours, and then the sense of taste returns to its normal condition. The active principle of the leaves of this plant appears to be soluble in water, alcohol, ether, and benzol. The aqueous solution of the substances soluble in alcohol had a decided acid reaction, and the author extracted an acid from it not unlike chrysophanic acid in some respects, but different in others. To this new product he has given the name of *gymnemic acid*, and it possesses the anti-sweet and anti-bitter properties found in the leaves as above described. The pulverized sundried leaves yielded about 6 per cent of their weight of this singular new product, about which we shall, no doubt, hear more in the course of a short time.

AN IMPROVED VEHICLE BRAKE.

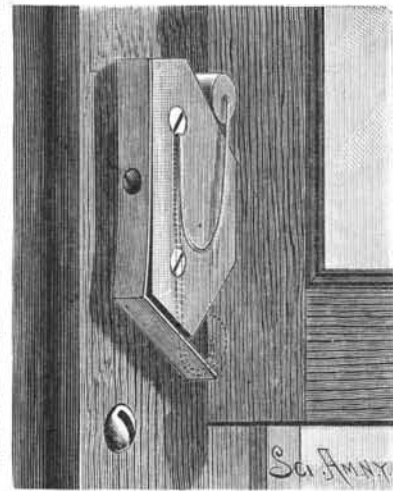
A wagon brake which can be conveniently operated, which need be moved but a slight distance to bring the shoes in contact with the wheels, and wherein the shoes may be normally positioned a much greater distance from the wheels than in the ordinary form of brake, has been patented by Mr. Marshal D. Platner, of Virginia City, Montana Territory. A double frame is secured to the side of the wagon body at the front, the lower bar of the frame having teeth making a fixed rack. Above the fixed rack two parallel plates are secured, a pinion being journaled to slide in slots in the plates, the teeth of the pinion engaging those of the lower fixed rack and of an upper sliding bar carrying a rack, the pinion being operated by a lever extending upward within a yoke, which is also provided with a series of notches whereby the lever may be retained in a locked or half-locked position. Beneath the reach, at the rear, a fixed plate is held horizontally suspended from the hounds and axles, having a double semicircular row of spaced and aligning apertures, and beneath this fixed plate a segmental plate is held to slide in more or less U-shaped brackets, one bracket being attached transversely to the under side of the rear axle, and the other to the hounds parallel with the axle. The sliding plate has at each end concentric slots, through which pass bolts adapted to guide the plate in its reciprocating movement. To the right of the running gear a horizontal bar is attached to the side of the hounds, and also to the under side of the rear axle, a crank shaft being journaled in the bar, whose inner end projects inward between the fixed and sliding plates, and carries a pinion adapted to simultaneously engage the apertures therein. The crank arm of the shaft extends upward outside the wagon body, and is pivotally connected with the sliding rack-carrying rod extending forward. The brake bar, carrying the brake shoes, is held to swing by any approved means, and derives its motion, by means of a connecting bar, from the sliding plate.



PLATNER'S VEHICLE BRAKE.

AN IMPROVED SASH HOLDER.

A simple form of sash support and lock, in which a plate having two oppositely inclined surfaces is secured to the window casing adjacent to the sash, and adapted to receive a roller between either of its inclines and the sash to support or lock the latter in position, is represented in the accompanying illustration, and has been patented by Mr. Joseph F. Ham-

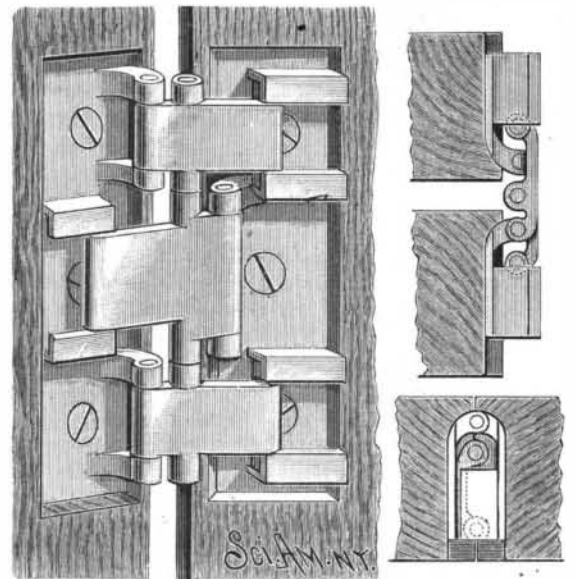


HAMBITZER'S SASH SUPPORT AND LOCK.

bitzer, of Houghton, Mich. To and against the inner face of the casing, adjacent to the face of the sash, a thick flat plate is held by screws, the inner edge near the top of the plate being inclined downwardly toward the sash, and its inner edge near the bottom being inclined downwardly away from the sash. A roller is suspended from a cord attached to the plate, so that when the roller is removed from its seat it will leave both hands of the operator at liberty for adjusting the sash, but by placing the roller between either of the inclines, the sash will be firmly supported and locked in the ordinary way, against an upward movement by placing the roller at the top, and against a downward movement by placing it at the bottom.

AN IMPROVED HINGE.

A hinge designed particularly for use in fine cabinet work, and which may be applied so as to be invisible from outside the joint formed thereby when closed, is illustrated herewith, and has been patented by Messrs. Ferdinand L. Scheidemann, of No. 3958 Girard Avenue,



SCHEIDEMANN AND BENDER'S HINGE.

and Frederick W. Bender, of No. 4048 Girard Avenue, Philadelphia, Pa. The hinge leaves are combined with links having one end pivoted to either hinge leaf and the other end adapted to travel on a guide on the opposite leaf, the links being connected pivotally together on a medial line nearer their pivotal than their traveling ends, as shown in the main view and sectional figure. The smaller figure represents the joint closed. When the joint is opened, the action of the scissors-like links is to automatically separate the two joint sections, while allowing them to fold outward, so that the crushing of the edges of the joint, which would ordinarily occur if the hinge pin directly connected the two sections on a line within the joint, as in this case, is prevented. A mortise is formed in each joint section to receive the respective hinge leaves and attachments, the mortise terminating at a short distance from the outside joint edge.

A STEAM catamaran, intended for whale and walrus hunting in the Arctic regions, is being built at Montreal, Canada. It has two steel cigar-shaped hulls, each sixty-five feet long, and built in two compartments, one for water ballast, and the other to carry petroleum for fuel. The catamaran is constructed so that it may be taken apart for transportation on the deck of a whaler.

The Big Bend Tunnel Completed.

For five years past a company of New York capitalists have been engaged in the stupendous undertaking of turning Feather River from its bed at the Big Bend, 16 miles above Oroville, in Butte County. [Illustrations of this remarkable work were given in the SCIENTIFIC AMERICAN of February 6, 1886.] Here a mountain spur has caused the river to make a detour, which, following the trend of the mountain for 14 miles, returns to a spot not more than two and one-third miles from the point on the opposite side. For years the Yuba and Feather Rivers have been noted for their richness in the early days of the State, and untold millions had been taken from their beds, but at this point the depth of the canon through which the river flowed, coupled with the large volume of water, made it impossible for the pioneer miners to extract the great stores of wealth. It is this which attracted the attention of Dr. R. V. Pierce, of Buffalo, New York, and he determined to associate a number of capitalists with himself, and by tunneling the mountain spur at the Big Bend obtain the gold which had defied all other efforts to get it.

The work of tunneling the mountain was begun five years ago and has just been completed. The tunnel is 12,000 feet, or nearly two and one-third miles, in length. One hundred men have been engaged on it night and day, using the largest sized Burleigh drills, driven by compressed air. The tunnel, as completed a year ago, was nine by sixteen feet, but this was found too small for the volume of water, and the aperture has been increased to twelve by sixteen feet in size. On October 16 the river was turned through the tunnel, which was found of sufficient capacity, and the bed of the river was laid bare. Numerous prospect holes were sunk at various spots, and gold was found in paying quantities, some of the places paying as high as fifty cents to the pan of dirt. Owing to the quantity of water coming through the gravel and the want of pumping machinery, but little can be done this season, but enough has been discovered to show the richness of the claim, which will be thoroughly equipped with all the necessary pumps for next season's work. The water of the river, as it comes from the tunnel, is at a height of 300 feet above the river below, and this tremendous fall will be utilized to generate electricity, which will be conveyed to the various pumps by copper wires, and again developed into force by the dynamos there. Dr. Pierce has brought a number of samples of gold nuggets and dust from the claim as an earnest of what is promised in the future. He is now stopping at the Palace Hotel, and is engaged in making contracts for his pumping machinery. This will be erected during the winter under the supervision of the superintendent, M. A. Harris, and all will be in readiness for next season's work. The cost of the tunnel has been nearly one million dollars. This expense has been borne by the Big Bend Tunnel Company, whose capital stock is \$20,000,000.—*S. F. Alta.*

The Heating of Points by the Electrostatic Discharge.

In a recent note on the heating of points by the electric discharge, M. Semmola thus describes some experiments he has made:

A point is used made half of antimony and half of bismuth soldered at the extremity, so as to constitute a thermo-electric couple. Having connected the point with the prime conductor of an electric machine, the poles of the thermo-electric couple are connected by wires with an insulated galvanometer of low resistance. When the plate of the machine is rotated, the needle of the galvanometer deviates because of the thermo-electric current produced by the heating of the point as it discharges the electricity of the conductor to which it is attached. (It is scarcely necessary to remark that with a mono-metallic point no current is produced.) A current may even be obtained by attaching the point, not to the conductor, but to a large metallic bar in communication with the ground and at a short distance from the machine.

On performing these experiments in the dark it is observed that when a small star appears on the point, the deviation of the needle is much greater than when the "plume of light" appears there. This proves that the discharge of negative produces more heat than does the discharge of positive electricity. By bringing the point near the conductor, so as to have a constant spark, thin, hissing, and visible in day light, the deviation of the needle decreases.

The electric blast of air that blows from the point is also hot, as can be easily proved by placing upon the conductor of the machine a curved mono-metallic point, a few centimeters distant from one of the faces of a Nobil's thermo-electric battery. On turning the plate of the machine, the electric blast blows against the battery and the galvanometer needle at once deviates.

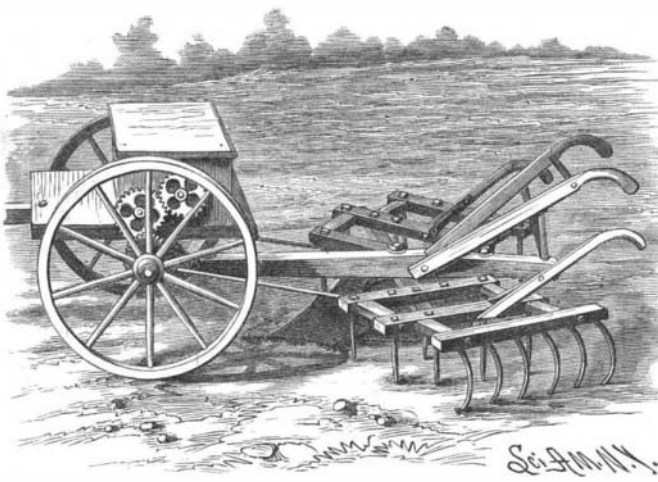
A point of bismuth and antimony or one of iron and platinum placed on a metallic bar in communication with the earth, and exposed upon the summit of an edifice, like a lightning rod, might in certain cases be

of use in examining the atmospheric electricity, and in detecting by the production of a current of feeble intensity the electricity of storms or of the *aurore borealis*.—*Revue Scientifique.*

A CULTIVATOR, DUSTER, AND DIGGER.

A machine intended to prepare ground to receive crops, to dust poison as required, and to dig or harvest potatoes or other crops, is illustrated herewith, and has been patented by Mr. William C. Davidson, of Grandville, Mich. The beam of the plow, having reversely set or double mouldboards, is connected at its forward end to the sulky axle, preferably by links engaging a clevis of the plow beam, the plow having the usual handles. In a couple of eye bolts in the sulky axle are hooked two draught bars, to each of which a cultivator harrow is held, each of which has a handle, allowing the operator to guide the harrows sidewise, or to lift them bodily to clear their teeth of trash or for passing over obstructions. The opposite harrows are so connected that they may be set nearer (or) farther from each other, according to the work to be done, and are so constructed as to allow of the attachment of interchangeable forks or mouldboards at the backs of the harrows, and disposed at like angle with the harrow-frame bars, to facilitate potato gathering.

On the sulky frame is fitted a box in which is journaled a cylinder or drum, its periphery being made of sheet metal and provided with a series of perforations, for scattering or dusting poison upon plants, there being any preferred arrangement for closing a portion of the holes in the drum, according as the poison is to be dusted upon plants set in drills or in a continuous line, in hills, etc. The drum is rotated by the advance

**DAVIDSON'S CULTIVATOR, DUSTER, AND DIGGER.**

of the machine, from a gear wheel fixed to the sulky axle, through a belt and pulley.

For simply dusting poison on growing plants, the plow and harrows are removed; and for gathering crops, the belt is unslipped from the drum-driving pulley.

The Tin Mines of California.

Within three or four miles of the railroad leading from Riverside to Santa Ana, is a deposit of tin ore, consisting of over 200 ledges carrying tin, or rather that number of mining locations, and more, were made some twenty years or more ago, upon what is now known as the Rancho Sobrante San Jacinto. This ranch, consisting of eleven square leagues of land, patented by the United States government in 1868, after a large amount of litigation, was purchased afterward by a corporation organized under the laws of our State, called the San Jacinto Tin Company, which at once took steps to ascertain whether or not there were tin lodes upon it. A thorough examination developed the fact that an area of about ten square miles was permeated with tin veins of various thickness to such an extent as to establish the fact that there was tin enough there to supply the United States with that metal. The company selected one location as easiest of access, called the Jahalco, and upon this vein sunk a shaft to a considerable depth, and ran drifts each way, developing one of the richest deposits of tin ore ever known.

Some one or two tons of tin was smelted from the ore in this city, in a crude way, from ores sent up from the mine. Quite an amount of tin sheets and tinware, as well as many bars of tin, were also made and exhibited at the Mechanics' Fair in this city in 1869, for which a gold medal was awarded. Some of the tin, both in bars and in the ore, was sent to England, and tested there fully, with the result of being found almost perfectly pure, carrying no wolfram, arsenic, or tungsten, as is usual with tin ores. At the time this company, which still owns the property, carried on this work, it was very expensive to get supplies and labor there. Los Angeles, fifty-five miles away, was the nearest place for supplies, which had to be hauled by wagon. Tin ores have to be treated in a peculiar way, requiring power to crush and concentrate, and fuel for this purpose, as well as to smelt the concentrations, was not

to be had then, in that section, unless at too great an expense.

When the company ceased work, not because the ore had given out, but because it would not then pay to work, the vein was over 8 feet in width of solid ore, carrying in tin from 5 to 50 per cent. The want of water, and the cost of transporting the ores to a point where water and fuel was to be had, was too great, and the company closed the mine. But enough had been done to justify the statement that within what is known as the tin district, of about 10 square miles, there are mines enough and tin enough to furnish all the tin required west of the Rocky Mountains, if not for all the United States.

Shortly after closing the mine, the company disposed of some 3,500 acres of its mesa land to the Riverside Company, which land now comprises a portion of that thriving place, and of Arlington. Afterward the government of the United States allowed its name to be used in a suit brought by a person named Baker, of Los Angeles, who owns, or claims to own, a large number of tin locations made in early times. This suit was decided in the United States Circuit Court here in 1885 by Judges Sawyer and Hoffman, after a long and expensive litigation, in favor of the company, in an exhaustive opinion. As the plaintiffs had two years within which to make an appeal to the Supreme Court of the United States, an appeal was taken within but just previous to the expiration of the time allowed by law, and the case is now before the Supreme Court, or rather will be before it in this term. As it has been advanced on the calendar to be heard on January 7, 1888, we may hope to get a final opinion upon it early in the new year of 1888.

If decided in favor of the company, we hope to see this industry of tin mining carried on with vigor, as it will add another to the many mining industries of our State. It is believed now that the railroad is so close to the mines that the ores can be transported to water and fuel so cheaply that the mines can be worked very profitably. Coal has been discovered within a few miles of the mines, and the Santa Ana River is but a few miles away.—*Min. and Indus. Advocate.*

The Alteration of Iron by Moderate Heat.

An important question to engineers and contractors having to do with iron and steel exposed to variations of temperature of more than a natural range—such as, for example, in connection with gas retort house work—was recently put in *Engineering* by Mr. A. Elink Sherk, the engineer of the Lake Haarlemmer drainage works. It appears that a chain hanging in the chimney of a pumping engine broke with the weight of a man in a gantry seat, although the material was the best that money could buy, and the links 5-16 inch in diameter. The chain was two years old when it broke. When new, the chain had been tested to 1,353 kilos (nearly 3,000 lb.). The manufacturer, on being appealed to, ascribed the breakage to the metal having been continually heated and cooled in the chimney, which made it hard, loose in grain, and brittle. As a matter of fact, the chain had been subjected 35 times *in situ* to the heat of melting lead and cooled again to atmospheric temperature. The curious point is that similar chains hanging in other chimneys for four or five years have apparently remained perfectly sound under exactly similar conditions, although these were not so good to begin with. In reply to Mr. Sherk, Mr. C. E. Stromeyer has written to state that in his experience steel and iron exposed to the heat of melting lead in the fumes of a sulphurous coal will lose nearly all their strength.

Mr. B. H. Thwaiter also suggests that the contact of the heated chain with soot might recarbonize the metal and turn it practically into cast iron. Mr. Thwaiter remarks, however, that mere heating and cooling, not in a chemically active atmosphere, will not alter the molecular structure of metals, and states that wrought iron tie bars of high temperature furnaces do not become altered chemically or physically. Any gas manager who has ever pulled down an old retort stack, in which tie bars may frequently be found turned to lumps of carbon rather than iron, will be able to testify that there are conditions in which iron alters its constitution and appearance, though buried in brickwork, and not subjected at any time to a red heat.—*Jour. Gas Lighting.*

American Dentistry Abroad.

Among the new companies lately formed in London is one entitled the American Dental Institute. Capital 1,000*l.*, in shares of 1*l.* each. Object, to promote the adoption of advanced American and other scientific methods of dental surgery; to protect the interests of dentists and the profession of dentistry; to consider all questions connected therewith; to promote or oppose legislative and other measures affecting the profession; to collect and circulate statistics and information in regard thereto; to act as and to appoint arbitrators for the settlement of any disputes in connection with dentistry.