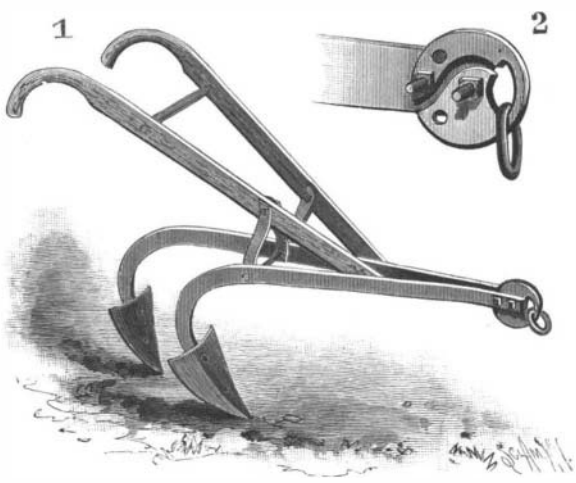
Effect of Storms on Birds.

The effect of approaching storms upon song birds is the subject of an interesting contribution by Mr. C. E. Linney to The United States Monthly Weather Review. It appears that during the night of August 15–16, 1898, severe electrical, wind, and rain storms prevailed over the northern district of Illinois. An observer in Henry County, Mr. W. W. Warner, noticed that for forty-eight hours before the storm not a sound was heard from the numerous song birds in the district. This observation was so full of interest that Mr. Linney wrote for additional information, with the result that he received numerous letters, some confirming it; others stating that birds sing louder and more persistently before a great storm, and nearly all agreeing that they are more restless than usual at such a time. Mr. Linney has found the following weather proverbs referring to song birds and storms: When birds cease to sing, rain and thunder will probably occur. If birds in general pick their feathers, wash themselves, and fly to their nests, expect rain. Parrots and canaries dress their feathers and are wakeful the evening before a storm. If the peacock cries when he goes to roost, and, indeed, much at any time, it is a sign of rain. Long and loud singing of robins in the morning denotes rain. Robins will perch on the topmost branches of trees and whistle when a storm is approaching. The restlessness of domestic animals and barnyard fowls before an approaching storm is well known, and many of their peculiarities have been noted; but the actions of song birds do not appear to have previously received particular attention.

A CONVERTIBLE PLOW.

A plow has been invented by Willard C. Cousins, of Ferrum, Va., which can be readily converted into an ordinary single-shovel cultivator or double-shovel plow, and which can be easily adjusted to bring the draft at any desired point. Fig. 1 shows the plow arranged as a double-shovel cultivator. Fig. 2 illustrates a peculiar form of clevis employed. The plow is provided with two beams detachably connected by means of bolts. Of these plow-beams, one is somewhat longer than the other; so that one shovel is located in advance of the other, thus forming a double-shovel plow. When it is desired to arrange the parts to form a single-shovel plow, it is necessary merely to detach one plow-beam. The front ends of the beams are held together by two bolts, one of which passes centrally through the clevis-plate and the other eccentrically. At their rear ends the two beams are joined by a transverse screw-rod,



COUSINS' CONVERTIBLE PLOW.

by means of which the distance between the beams and shovels can be regulated. The plow-handles are secured to the longer plow-beams, and, when two shovels are used, are held in position by means of detachable braces.

The clevis, as shown in Fig. 2, is disk-shaped, and is provided with centric and eccentric apertures to receive the two bolts previously mentioned. The eccentric apertures are three in number, and by their means the draught can be brought to any desired point. At its front end the clevis is provided with an opening to receive a solid ring which is designed to engage the whiffletree hook, and which enters the opening by means of a curved slot. The front ends of the beams are recessed to receive the ring. The ring is adapted to be confined at the top, bottom, or center of the beam recesses, depending upon which eccentric perforation in the clevis is used in conjunction with the bolt.

The plow is simple and cheap in construction, is capable of being easily converted into a single or double shovel cultivator, and of being adjusted to vary the draft and bring the ring at the top, bottom, or center of the front ends of the plow-beam.

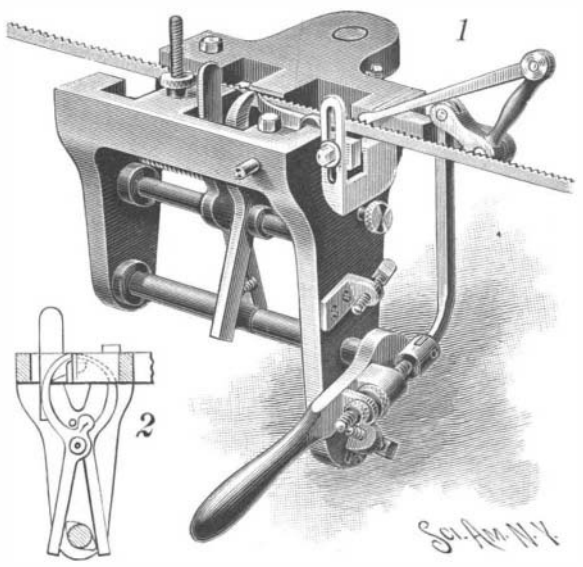
IN the disinfection of stock cars on the Continent it has been found impossible to obtain satisfactory results with either carbolic acid, steam, or formaldehyde. Satisfactory results have, however, been obtained with a five per cent solution of chloride of lime.

AN IMPROVED BAND-SAW-SETTING MACHINE.

A band-saw-setting machine which is constructed to feed the saw forward properly, and to bring the teeth accurately into position for the setting-tools to act on the teeth, has been invented by Pierre Sicotte.

Fig. 1 of our illustrations shows the machine in perspective. Fig. 2 is a transverse section, showing the arrangement of the setting tools.

On the machine-frame vertically adjustable saw-



AN IMPROVED BAND-SAW-SETTING MACHINE.

rests are mounted, one of which is located adjacent to two anvils arranged to face the saw-blade on opposite sides. One of the anvils can be laterally adjusted for saws varying in thickness. On their upper ends the anvils are formed with bevels against which the corresponding saw-teeth are set by longitudinally adjustable setting-tools moving transversely to the saw and to the anvils. These setting-tools, as shown in Fig. 2, are pressed against the saw-teeth by means of cams on a rock-shaft journaled in the lower portion of the frame. To prevent the springing of the saw-blade during the setting, guide-fingers are employed, the free ends of which are arranged opposite the anvils to engage that portion of the blade directly under the tooth to be set at the time.

The saw is fed by means of a pawl which engages the teeth and which is operated by a bell-crank lever connected by a link with an arm which is secured to the rock-shaft previously mentioned, and which, therefore, coacts with the cams operating the setting-tools. An adjusting device is carried on the arm to give any desired throw to the pawl, according to the size of the teeth of the saw to be set, without, however, changing the opening and closing device for the setting-tools. In their normal positions, the setting-tools are out of engagement with the saw, When the arm secured to the rock-shaft is swung down, the cams on the rock-shaft force the setting-tools into engagement with the corresponding teeth of the saw, to set these teeth in opposite directions. Hence, two saw-teeth are set at one operation, without danger of springing the blade, owing to the arrangement of anvils and guide-fingers previously described. Simultaneously with the operation of the arm, the feeding-pawl will be operated through the medium of the connecting link and bell-crank lever, to move the saw forward. From the arrangement described it follows that the setting tools and feeding-device are both actuated by the operation of the arm.

The patents for this machine are controlled by the Helmers Manufacturing Company, of Leavenworth, Kans.

The New French Phosphorus Matches.

In 1895 the outcry against the horrors of phosphorus necrosis induced the French government to appoint a scientific commission under the presidency of Troost, charged with the task of finding, if possible, a substitute for yellow phosphorus. By September, 1897, that commission had almost resolved to report that none of the many preparations examined offered a solution of the problem, when Sévene and Cahen, of the state manufactory, submitted their matches. These matches contain phosphorus sesquisulphide and chlorate of potash. The sesquisulphide is a gray-yellowish substance, which is prepared by heating amorphous, i. e., non-poisonous, phosphorus and sulphur. The substance is very stable. Lemoine, who studied it in 1864, kept it for 15 years exposed to the air without noticing any change. Its latent heat is low; it ignites at 95° C. (203° Fah.), and can therefore be lighted by rubbing like ordinary phosphorus. The mixture with chlorate of potash burns quietly, while the mixture of amorphous phosphorus, which takes fire at 260° C. only, and chlorate of potash is really explosive. For this reason inert substances are added to the chlorate in safety matches; but we still occasionally find safety matches which spit unpleasantly. The new matches are not likely to contain other impurities than amorphous phosphorus and water. They have become popular during the few months they have been obtainable, and are known as the S. C. matches, after the initials of their inventors. The public may hardly have noticed the change, for in their appearance the new matches resemble the old; they may have a faint smell—more a sulphide than a phosphorus smell, however. The sesquisulphide, at any rate, has such a faint smell that the employés in the works are said not to complain about it. The new matches do not phosphoresce even when rubbed energetically, but they are poisonous to a very slight degree. The intending suicide would, however, have to swallow 6,000 matches to put an end to his troubles. We do not think, therefore, that the matches need be labeled "poison." If they can really be manufactured, transported, and stored with safety, and be relied upon to strike, the inventors have claims upon our gratitude. The S. C. matches are manufactured at Trélazé, Begles, and Saintines; no accidents have occurred as yet.—Engineering.

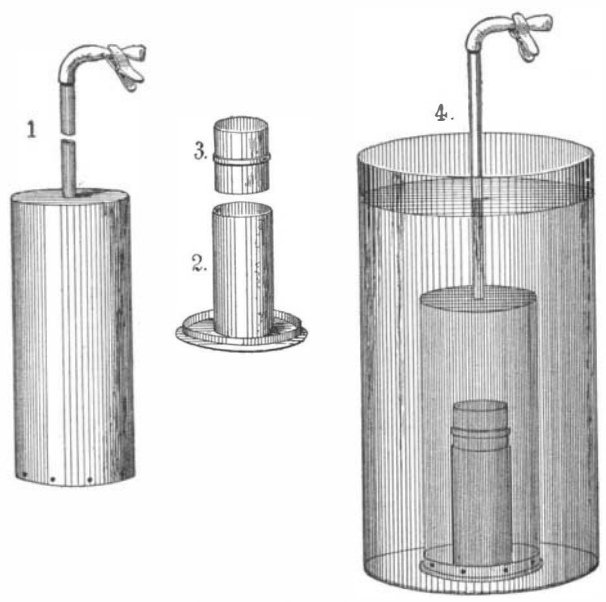
A CHEAP METHOD OF MAKING A CALORIMETER.

A calorimeter for determining approximately the heating value of any combustible solid, as coal, may be made at a cost of one dollar or less. The bomb calorimeters for making absolute calculations cost several hundred dollars; but where results do not need to be absolute and expensive instruments are not to be had, the instrument described below may be used, and with comparatively accurate results.

A sheet of heavy copper is made into a cylinder 7 inches high and 3 inches in diameter, as in Fig. 1. Over one end of the cylinder is soldered a copper cap, from which runs a copper tube perhaps ¼ of an inch in internal diameter. Let the tube be 12 inches high and have a stop-cock at its extremity, or, perhaps, have a few inches of flexible rubber tubing attached which shall have a pinch-cock. To the other end of the cylinder fit a movable cover with an inside, tightly fitting flange, like the cover to any small pail. Within this cover solder a copper cylinder 3 inches high and 1½ inches in diameter, as in Fig. 2. Next make a cup, as in Fig. 3, which is 1½ inches high and a trifle less than that in diameter, placing around it, on its middle line, a flange, so that it may be placed partly in the cylinder of Fig. 2. Obtain a glass jar 6 inches in diameter and 1 foot high, or with about these measurements. The completed calorimeter is shown in Fig. 4. Several holes are punched near the bottom of the outside cylinder to allow the egress of the gases and the ingress of the water from the glass jar.

The British thermal unit is the amount of heat necessary to raise the temperature of one pound of water from 39° F. to 40° F. Hence, if 3 grammes of fuel is burned in the cup and 2,901 cubic centimeters of water is present, the heating value will be as many calories as the temperature of the water is raised in degrees.

A mixture of 3 parts of potassium chlorate and 1 part of potassium nitrate is mixed with the fuel to supply oxygen for the combustion; and, as the nitrate absorbs heat and the chlorate gives off heat upon burning, when mixed as above the effect of each is



A SIMPLE CALORIMETER.

neutralized. After the combustion has taken place the stop-cock is opened, so that the water may fill the apparatus and absorb all the heat that has been evolved.

It is best to test the apparatus first with some fuel, as sugar, whose heating value is known, that the percentage of error may be reckoned in the results obtained with the fuels to be tested.

FRANK F. BRADLEY.

ON Prince Schwarzenberg's game preserves in Bohemia 106,604 wild animals were killed during last season. They include over 200 deer, 250 boars, 27,000 hares, 39,000 grouse, and 6,000 wild geese and ducks.

Miscellaneous Notes and Receipts.

New Type Metal.—Instead of the current type metal consisting of lead, antimony, and tin of a specific gravity of about 11, a new alloy containing a large quantity of aluminum and possessing a specific gravity of 2·56–2·67 is said to have been invented. Besides being non-poisonous, other advantages, such as the quality of taking and giving off the ink more readily, etc., are claimed for this alloy.—Zeitschrift fuer die Buchdrucker Kunst.

Gilding of Glass or Porcelain.—To gild glass or porcelain, instead of the ordinary mixture a solution of gold chloride in oil of turpentine or lavender oil, to which a little bismuth nitrate and chrome soap have been added, is employed. The following mixture is said to give good results: Lavender oil, 900 grammes; gold chloride, 100 grammes; bismuth subnitrate, 5 grammes; chrome soap, 50 grammes. After the application allow the mass to dry and bake the articles in the muffle furnace. The gilt portions show a nice gloss, without any subsequent treatment.—Neueste Erfindungen und Erfahrungen.

Deodorization of Rubber Rings.—At the meeting of the Verein der Mineralwasser-Fabrikanten (Society of Manufacturers of Mineral Waters) the following methods of killing the smell of rubber rings were proposed, says the Zeitschrift fuer die gesammte Kohlensäure Industrie: Treating the rubber with solutions of caustic potash or caustic soda; treatment with potash or soda, since caustic potash and caustic soda injure the rubber; boiling with alkaline soaps; boiling with lescive phenix—calcined soda with water glass; and lastly, after treatment with soda, leaving the rubber for some time in a solution of cooking salt (10–15 per cent).

Grease for Wooden Combs.—Take equal parts of beeswax and finely crushed graphite, pour on varnish until it well covers the first two ingredients, and melt the whole over a very weak fire. When the mass is pretty thin, add soft soap, about half as much as wax, and boil. Another lubricant consists of the following: Wax, 25 parts; tallow, 50 parts; graphite, 10 parts; molybdena, 5 parts; soft soap, 5 parts; pine oil, 5 parts. This mixture is mixed hot and applied while warm. Finally, it is recommended to grease the wooden combs simply with pure beeswax, which is put on warm and quite thin.

For iron combs which are not smooth enough, wax dissolved with a little glass flour is employed.—Farben Zeitung.

New Process of Cleaning Bed Linen.—In a circular, the surgeon-general of the German army, Colar, in Berlin, calls the attention of the heads of the garrison hospitals to a new cleaning method, which is to be employed in future, as thorough experiments have proved it to be of advantage. According to this method, petroleum is added to the water besides soap and soda, taking as many grammes of it as there are liters of water used; e. g., 30 grammes of petroleum to 30 liters of water. This admixture of petroleum does not only admit of an easier cleaning, as well as less tear and wear on the linen, but the wash also retains its color, is thoroughly disinfected, and the expenses are considerably reduced by a saving in soap.—Neueste Erfindungen und Erfahrungen.

Leather Grease.—For the production of leather grease the Seifenfabrikant gives the following receipts:

1. Melt together 4 parts of vaseline and 1 part of wax or ceresine and add a coloring matter, if desired.
2. Well warm and mix vaseline, 15 parts; fish oil, 20 parts; tallow, 12 parts; and wax, 1 part. If a black color is desired, dye the vaseline and fish oil alone with lampblack and then add the tallow and wax. The whole is stirred cold and filled in cans.
3. Melt together yellow vaseline, 1 kilogramme; olive oil, 70 grammes; ceresine, ½ kilogramme; "lederine" yellow, 1 gramme, and stir until cooled.
4. Tallow, 71 parts; resin, 4 parts; castor oil, 38 parts. Dissolve the resin in the warm tallow, strain the whole, pour in the castor oil, and stir until, after standing some time, a light film forms on the surface of the fat. A black color is imparted with 5 parts of Frankfort black; for yellow, take only 66 parts of tallow in mixing, but add 5 parts of crude palm oil.

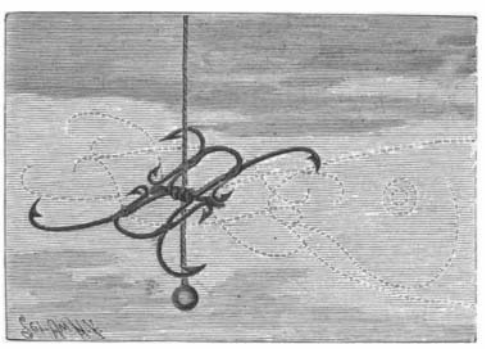
For perfuming the leather grease, oil of mirbane or oil of lavender is employed.

Green or Golden Color for Brass.—French articles of brass, both cast and made of sheet brass, mostly exhibit a golden color, which is produced by a copper coating. According to the Schweizerische Industrie Zeitung, this color is prepared as follows: Dissolve 50 grammes of caustic soda and 40 grammes of milk-sugar in 1 liter of water and boil a quarter of an hour. The solution finally acquires a dark yellow color. Now add to the mixture, which is removed from the fire, 40 grammes of concentrated cold blue vitriol solution. A red precipitate is obtained from blue vitriol, which falls to the bottom at 75° C. Next, a wooden sieve, fitting in the vessel, is put into the liquid with the polished brass articles. Toward the end of the second minute the golden color is usually dark enough. The sieve with the articles is taken out and the latter are washed and dried in sawdust. If they remain in the copper solution they soon assume a green color, which in a short time passes into yellow and bluish green and finally into the iridescent colors. These shades must be produced slowly at a temperature of 56°–57° C.

AN AUTOMATIC SPRING FISH-HOOK.

A patent has been granted to James Y. Payton, of Waldron, Ark., for a novel spring-hook which is constructed to close and catch a fish when the bait has been seized.

The fish-hook comprises two spring grab-hooks connected at their central bends and two spring bait-hooks pivoted to the grab-hooks and arranged symmetrically with relation to each other. When set, the hooks all lie in the same horizontal plane, the bait-hooks holding the grab-hooks distended as shown by



AN AUTOMATIC SPRING FISH-HOOK.

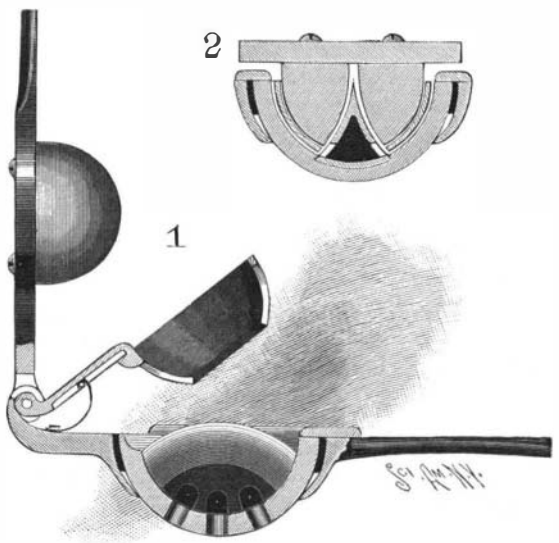
the full lines in the illustration. As each pair of hooks is maintained in unstable equilibrium, the hooks can be readily tripped by the fish, by a slight pull upon the bait-hook, by clamping or biting, or by causing a displacement of the abutting bait-hooks. The hooks' action depends upon the tendency of the springs to free themselves. Following this tendency the external grab-hooks, when the bait has been seized, approach each other, unless one of them be obstructed. But the obstruction of the one in its forward movement has no effect upon the other, since each hook acts independently by the tension of its spring. The dotted lines show the grab-hooks in the act of closing upon a fish, the bait-hooks projecting forwardly into the mouth of the fish, thus doubly securing it.

AN IMPROVED LEMON-SQUEEZER.

A lemon-squeezer has been invented by John W. Neal, Kealia, Kauai, Hawaiian Islands, in which two sections are hinged together and provided with a bowl and knife, so that, when the lemon is forced into the bowl by the movement of the sections toward each other, the knife will cut the lemon simultaneously with the squeezing,

Fig. 1 is a side elevation of the invention, with parts in section. Fig. 2 is a cross-section.

Of the two sections of the lemon-squeezer, the one



NEAL'S LEMON-SQUEEZER.

carries a bowl and the other a follower, both conforming with each other. Between the sections an ejector is mounted to swing, which is normally spring-pressed into the position shown in Fig. 1. Within the bowl of the one section a knife is secured which, as shown in Fig. 2, is adapted to enter a slot in the ejector and a slot in the follower.

In using the device, the lemon is placed in the ejector-cup. The follower-section is now thrown down, so that the follower engages the lemon and pushes it down with the ejector-cup, thus causing the fruit to be cut by the knife and simultaneously squeezed between the follower and the ejector-cup. After the lemon has been squeezed, the follower is raised; whereupon the ejector will be thrown to normal position by its spring, thus dislodging the lemon-rind.

Science Notes.

Thermometers for indicating low temperature may be filled with petroleum ether, which freezes at —190° Centigrade (—310° Fahrenheit). — Uhland's Wochenschrift.

Prof. J. K. Rees, Professor of Astronomy at Columbia College, has announced the gift of $10,000, the money to be used for the measurement and discussion of astronomical photographs. The gift was made by Miss Catherine Wolfe Bruce, who has previously made important gifts for astronomical work.

Consul-General Goodnow, of Shanghai, reports the arrival at that port of the surveying party which has just completed a survey of the proposed railway from Hankau to Canton under contract to an American company. No trouble was made by the inhabitants of the region and all kindness was shown and assistance given by the local gentry and officials.

United States Consul Higgins, of Dundee, sends an account of a plowing match near that city. These matches are held for the purpose of encouraging laborers to adopt this occupation. Prizes were awarded for plowing, for harness and grooming, and for "finishing" or clearing up furrows. Quite a few American plows are in use and opinions are favorable to their adoption.

A new Arctic expedition will soon sail from St. John's, Newfoundland, under the charge of A. Barclay Walker, the well known English yachtsman. Mr. Walker intends to cruise in Arctic waters in the "Dundee," a steam whaler, during the next six months, with a party of scientists, including representatives of the Smithsonian Institution. They will probably attempt to reach the headquarters of Lieut. Peary, in Robeson Channel.

A locomotive headlight using acetylene gas has been devised by a Canadian inventor. The apparatus consists of a cylindrical cast-iron generator, five inches in diameter and twelve inches long, together with a water reservoir and condenser. The charge consists of about ten pounds of carbide, which is put in a wire basket and placed inside the generator. The water from the reservoir, dropping on the carbide, generates the gas, which is led through a small pipe in front of the reflector.

At the Rhode Island College of Agriculture and Mechanical Arts, at Kingston, a special course in poultry culture began on January 9 and continued for four weeks. Nearly forty applications for enrollment for the course were received, but, owing to limited accommodations, the class had to be kept down to about twenty in number. Several who could not take this course enrolled their names for the next one in 1900. It is a curious fact that even poultry raising has been thought worthy of a special course in an agricultural college.

Governor Roosevelt, of New York State, has signed the bill to prevent the spread of bacterial diseases and permitting witnesses to dispense with the kissing of the Bible in the administration of oaths. It is very satisfactory to note that proper sanitary regulations have now reached even the police courts, where they were badly needed. For a long time, however, many of the magistrates have not used the Bible in the court room, or have warned witnesses against using it, and great credit is due to Magistrate Pool, who inaugurated the move to do away with the kissing of the Bible in court.

McGill University, Montreal, Canada, will soon suffer a severe loss on account of the resignation of Dr. Nicholson, Professor of Mechanical Engineering, who, after eight years, has resigned to become the head of the mechanical and electrical engineering departments of the Great Municipal Technical School now being established at Manchester, England, at a cost of $600,000. The field of work which Dr. Nicholson will have opened to him is much larger than that at McGill University, for he will attempt to encourage research work on the part of managers and foremen of engineering and other establishments where they are brought into immediate contact with practical problems.

A new method of marking glasses of spirit levels and other instruments has been devised by a Connecticut concern making levels and other instruments. The usual way of marking glasses is to scratch lines on the surface of the glass, but the skin of the glass is thus weakened and the glass itself made very liable to fracture. In the new process, by fusing the glass at the mark and incorporating with it minute particles of metal, a colored line is obtained. The metal is embedded in and inclosed by the glass, which effectually protects it. In fact, the glass at the grooves has been so strengthened that it will break first at some other point. In addition, the line is absolutely indelible and permanent, and is sharp and well defined. This is effected by bringing the spirit tube up to an iron disk rotated at a velocity of about 2,500 revolutions per minute. The frictional heat generated practically fuses the glass at the point of contact with the wheel, and in this fused portion fine particles of iron given off by the wheel are embedded. A microscopic examination of the line proves this to be true. An actual mechanical union of iron and glass is the result.