ORNAMENTAL ENTRANCE GATE.

Our engraving shows an ornamental carriage gate, built by the Coalbrookdale Company, after designs prepared by Mr. Maurice B. Adams, A.R.I.B.A. The gate is of cast iron, and alike on both sides.

Incombustible Houses.

The architect to the municipality of Verdun, M. P. Chevenier, has contributed to the *Genie Civil* a paper on the incombustibility of buildings, which, although more particularly relating to the large Continental house containing *appartements* on the several floors, nevertheless gives some general advice for the arrangement of buildings, so as to prevent fires from attaining unmanageable proportions. He is of opinion that, until preparations for rendering materials incombustible have stood the test of time, their use should only be resorted to by way of additional precaution, while the buildings themselves should be so constructed that any fire which may happen to break out would be confined within very narrow limits.

The piers that support the principal parts of the structure should be built of such materials as stand heat well without appreciable alteration of form; and preference is given to sandstone, millstone, grit, flint, and granite, the joints being made with argillaceous cements like those of Portland. The main portions of the internal walls should be built of similar materials, or, at any rate, faced with them. As regards the exterior, it will be sufficient to face the lintels and allaying of the windows, which are specially liable to be licked by flames.

Indeed, as a rule, the framework of all openings, both in the interior and exterior, is more exposed than the intermediate portions, and should therefore be better protected. When, on account of the design, the walls of the facades cannot be well stayed with masonry, they should be tied by iron rods let into the floors, or by anchors attached to the ends of the main girders. In this manner, walls standing alone for a great height are prevented from twisting, and are exposed to the action of the heat on one of their faces only.

The best way to insure the stability of a building under the influence of fire is to keep the floors from giving way. This is easy enough when they are of iron and pugging, but requires special precautions when they are made of combustible materials. MM. Flachat and Noisette have come to the conclusion that a half inch layer of asphalt over an inch of argillaceous earth is sufficient to protect a floor, both at top and bottom, in the event of a fire occurring; and this system is carried out at the fodder lofts of the Paris General Omnibus Company. A layer of plaster of Paris, fine concrete, cement, or clay, 3 or 4 millimeters—0 11 to 0·15 inch thick—or a paving of tiles, permits of waiting for assistance, by preventing the air from coming in contact with the wood, and thus maintaining combustion.

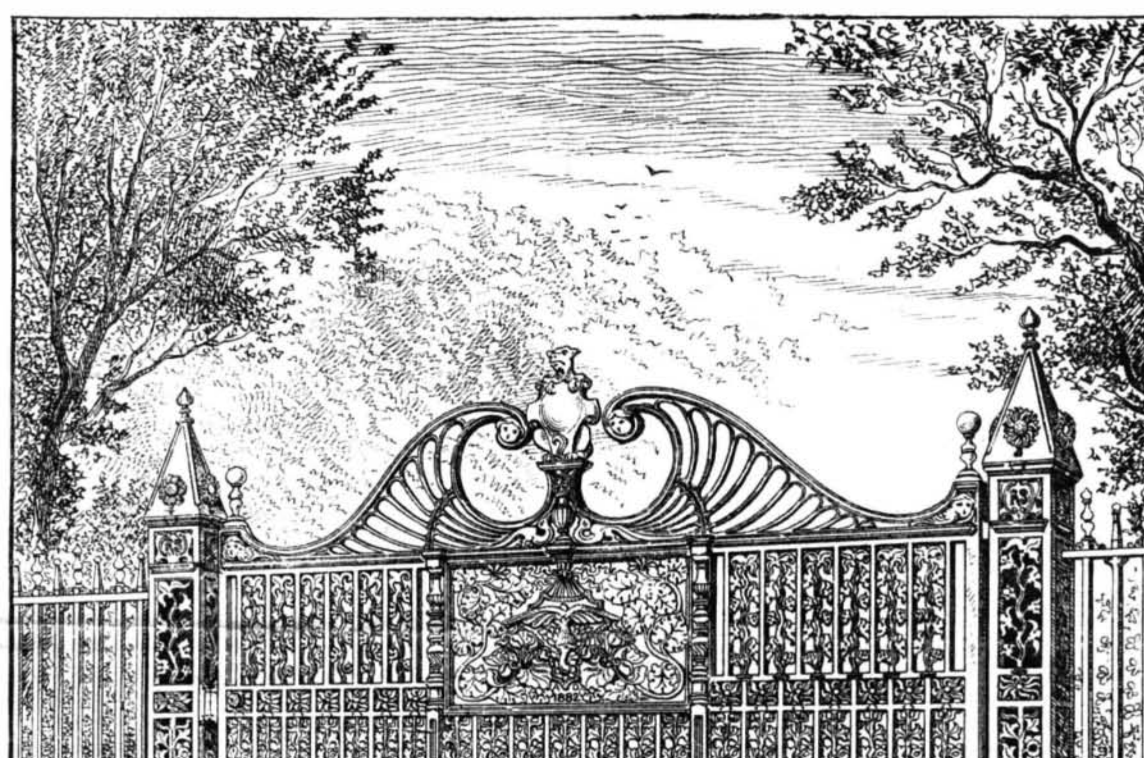
The ceilings should be thick and laid on wire gauze, to the exclusion of laths; and channels in them should be botched with clay, small twigs, and chopped hay. Similar precautions should be taken with the roofs between the rafters, thus insuring tightness, a conservation of heat, and a diminution of danger from fire. The simplest arrangement consists of a rough ceiling of plaster and argillaceous sand on wire gauze nailed under the rafters, and a planking with closed joints under the roofing proper, which should be incombustible, and consist of slates, tiles, or sheet metal.

In the case of iron floors being adopted, the parquetry should be laid on pitch or cement; and special precautions should naturally be taken with the grates and chimneys.

As the floors are supposed to be incombustible, the fire can only extend from story to story by the staircase, which must, therefore, be isolated from the rest of the building. The well should be surrounded by thick walls capable of arresting the flames; and the landings should be flagged and arched or constructed of iron and concrete. The notch board may be of iron or stone, and the steps of cast iron and tiles, or even of wood set in cement. In this latter case, the wood does not easily catch fire, as the air can only get to the upper surface. There should be incombustible and almost hermetically tight appliances for closing all openings from the several landings. Thus doors of thin sheet iron with wrought iron frames may be employed; or the doors may consist of two faces of woodwork with a sheet of iron between. The top of the well should be closed in by wrought iron and bricks that stand the fire well; and the staircase windows should be made incombustible by means of metal frames and mica panes.

The outside windows of the edifice may be provided with Venetian blinds of iron, rolling blinds of wire gauze, or iron shutters, to be closed in the event of danger threatening. To prevent the fire from spreading by the roof, it will be broken by transverse gables at intervals; and the use of combustible materials in all projecting ornamentation is to be avoided.

In conclusion, M. Chevenier does not consider it indispensable that all the materials of a house should be incombustible or non-inflammable, but he contends that the carcass of the house should be built in such a manner as to localize the fire; and, to insure this, it will be sufficient to adopt the measures named above. This does not prevent the use of materials, such as the roofing timber, for instance, from being rendered incombustible by any of the various processes for this purpose.



SUGGESTIONS IN DECORATIVE ART.—ORNAMENTAL CAST IRON GATEWAY.

Learning a Trade.

Referring to the inauguration of a class in the science of plumbing, under the auspices of the Metropolitan Museum of Art, in this city, a correspondent of the Philadelphia *Record* says: "If this will diminish the number of young men whose highest ambition seems to be to stand behind the counter and wear good clothes, it will be a public benefaction. There is a great deal of money in trades and very little in counter jumping, and yet only one young man in a hundred is willing to blacken his hands with tools. It is not always the boy's fault, however. A gentleman of my acquaintance, who is a broker in Exchange Place, said to me recently: 'I ought to have been a machinist; I would have been rich by this time. When I was a boy I wanted to go into the Allaire Works, but my father was afraid it would soil my hands. He wanted me to be a gentleman. The result is that I have never liked my business, and never made more than a living at it. Had he let me go in as an apprentice in the machinist trade, I would have been building engines and coining money by this time, and my whole heart would have been in it.' The fathers of to-day in New York are the same. They would almost as soon bury their sons as make them apprentices. The result is a race of mediocre clerks and book keepers, who find their intellectual level in the flash newspapers of the day."

Electrolytic Studies.

Bartoli and Papassogli have devoted much time to the study of the effect of electrolysis upon different substances. They subjected a large number of binary compounds, also acids and salt solutions, to the action of an electric current, using carbon poles. Their results are thus summarized in the *Gazzetta Chim. Ital.*

1. In those liquids in which no electrolytic oxygen is evolved at the anode, the carbon that forms the positive pole is not perceptibly consumed. One exception to this was hydrofluoric acid, in which the gas carbon used as positive electrode was rapidly consumed.

2. In those liquids in which free oxygen was liberated by electrolysis at the positive pole, this pole was rapidly destroyed when made of gas carbon, as well as those of wood charcoal and graphite. Anhydrous carbonic acid (CO_2), carbonic oxide (CO), and other gases were evolved, according to the carbon used.

3. When graphite was used, the liquid did not change color; gas carbon and wood charcoal (purified by heating in a current of chlorine) gave an intense color in alkaline solutions, and also in the solutions of a few acids and salts. [It is known that the electrolysis of caustic alkali, using cast iron poles, gives an intensely deep red solution.—TRANS.]

4. If gas carbon or wood charcoal is used for the positive electrode in acid and neutral solutions, where oxygen is given out at the anode, there is formed in addition to carbon monoxide and dioxide (CO and CO_2) a solid black substance called *Mellogen* ($C_{11}H_2O_4$), and only traces of benzo-carbonic acid. In the solutions of phosphoric acid, hydrofluoric acid, or potassium antimoniate, a substance is obtained resembling mellogen, but containing either phosphorus, or fluorine, or antimony.

On the other hand, when graphite is used for positive electrode, there is formed, besides the carbonic acid and oxide, chiefly graphitic acid ($C_{11}H_4O_5$), or some similar substance containing, as before, phosphorus, fluorine, or antimony, respectively.

5. In alkaline solutions using gas carbon, wood charcoal, or graphite for positive electrode, they obtained mellitic acid ($C_{12}H_6O_{12}$), pyromellitic acid ($C_{10}H_6O_8$), hydromellitic acid ($C_{12}H_{12}O_{12}$), and hydropyromellitic acid ($C_{10}H_{10}O_8$).

A Seed Tester.

A correspondent in the *Farm and Fireside* gives the following directions for testing the quality of seeds.

My plan, he says, is to make a box about six inches deep. Fill in four inches of good soil; on this lay a thin piece of muslin, just enough to fit the box, and make it nicely level on the soil. On this muslin put one hundred seeds of the kind you wish to test. Cover them with another piece of muslin, and an inch of earth. When done, water with slightly warm water and set away in a warm place. The sprouting process can be much facilitated by placing the box on the stove, daily, after the fire is nearly out, so that the stove is just warm enough to heat the bottom of the box. Otherwise the box can be set on bricks that are heated daily for the purpose. After four or five days lift off the top dirt and its covering of cloth carefully. Count the seeds that have sprouted, and if only fifty of each sort have sprouted, procure new seed. If over seventy-five are sprouted, and the sprouts all look vigorous, the seed will do very well. Of course, the greater the per cent of those that sprout, the better.

A Scientific Centenarian.

Perhaps never in the history of science, says the *Lancet*, has a distinguished career equaled in its length that of M. Chevreul, whose name is best known in connection with his investigations on color; and it is probably altogether unique for a *savant* to be able, at one of the most distinguished scientific societies in the world, to refer to remarks which he made before the same society more than seventy years previously. A few days ago M. Chevreul made a communication to the Académie des Sciences, and at its close he observed: "Moreover, gentlemen, the observation is not a new one to me. I had the honor to mention it here, at the meeting of the Académie des Sciences, on the 10th of May, 1812"!

The Heloderma Horridum.

Soon after publishing an illustration of the lizard which crawls about under the weight of the above frightful name, in our issue of October 7, 1882, we had inquiries from various sources for further information relative to the *Heloderma horridum* and its habits. In the paper referred to, page 231, vol. xlvii., and in previous issues considerable is said respecting the harmlessness of the creature on the one hand, and its venomous qualities on the other. It seems the subject relating to the above species of lizard came up for discussion at a recent meeting of the College of Physicians, in Philadelphia. Drs. Mitchell and Reichert exhibited a living specimen of this lizard, and the former read a paper on the nature of the poison, in which he arrives at the following conclusions: The *Heloderma horrida*, which is found in Arizona, is the only one of the lizard family that is poisonous. It is usually sluggish in its habits, and will not bite unless provoked; but when the full sized lizard (it grows to a length of three feet) does bite, it produces a poisonous wound, which may prove fatal. For the purpose of experiment, Dr. M. caused the lizard to bite on the edge of a saucer, and when saliva commenced to flow it was caught on a watch glass. Differing from the saliva of venomous reptiles, which is always acid, the saliva of the *Heloderma* is alkaline. A very small quantity injected into a pigeon produced its effect in a tottering gait in less than three minutes, and caused death in less than nine minutes. The specimen presented was fourteen inches long, fat and plump, and presented somewhat the coloring of a rattlesnake.

Why Aniline Black turns Green.

According to C. Koechlin in the *Farberei-Muster Zeitung*, the low temperature at which they are formed is the cause why some aniline blacks turn green. Black prepared at temperatures above 70° C. (158° Fah.) will never turn green, no matter what metallic salt was employed in its preparation, provided there was enough of it, and that the action lasted long enough.

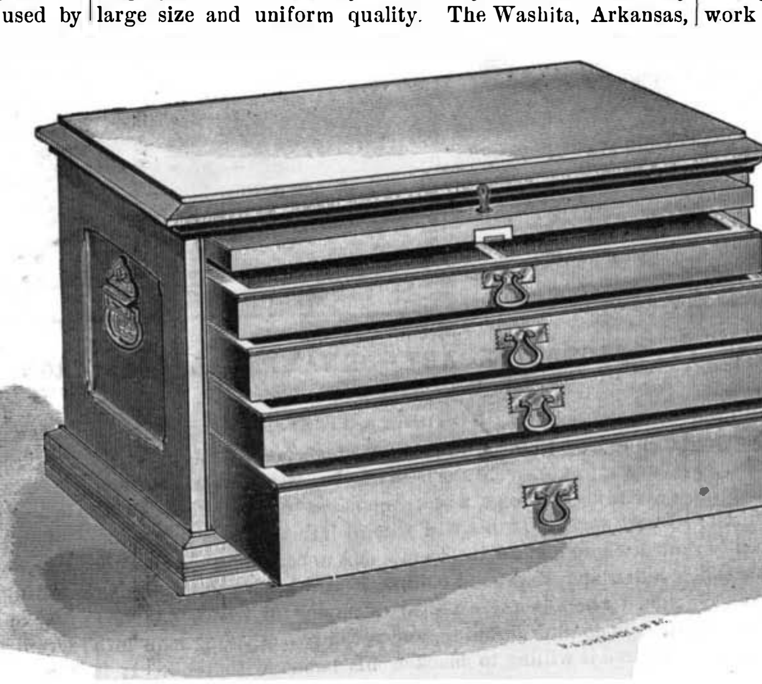
The effect of heat is best seen in Lauth's process of dyeing with oxide of manganese in aniline solution. If worked cold it produces a black that turns green, and so it does if the temperature is not over 50° C. (122° Fah.). Between 50° and 60° C. the black still shows some change, while in that formed between 75° and 100° C. (167° to 212° Fah.) no change at all can be noticed. In dyeing by Lauth's system the aniline solutions blacken rapidly and the colors smut off, which may be due to the formation of manganese brown. This evil can be removed by adding to the aniline one-twentieth of its weight of naphthylamine, and working with very dilute solutions, for example, 2 or 4 grammes of the sulphate of the alkaloid and 20 grammes of "*Leiocome*" or roasted starch to the liter (0·2 or 0·4 per cent). This process is the quickest and cheapest, and has least effect on vegetable fibers. When chromate of potash is used the cloth is first saturated with aniline, then put through a boiling bath saturated with the chromate (40 per cent).

A NEW TOOL CABINET.

The accompanying engraving illustrates a very ornamental and convenient chest of drawers of varying depths, for holding different sized small tools, such as are used by watchmakers, jewelry repairers, dentists, and others using delicate instruments.

Under the top of the cabinet directly above the drawers, a panel is slid quite out of the way. After using the contents of the cabinet for the day, the instruments are placed in their respective places in the drawers, when the latter are closed and the panel is brought down over the front and locked, fastening all the drawers, and at the same time producing a harmonious and ornamental appearance to the cabinet on all sides. The cabinet is made preferably of black walnut, and is handsomely mounted with bronze and nickel plate trimmings. But they may be manufactured of other woods, and the drawers changed in height or divided differently from the one we are describing, to hold mineral specimens, coins, or other curiosities.

These cabinets are made and sold by Messrs. Goodnow & Wightman, 176 Washington Street, Boston, Mass.



NEW TOOL CABINET.

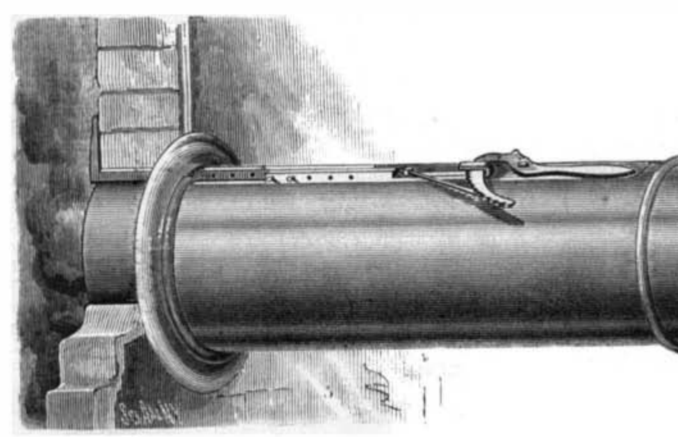
Ants that Eat Roses.

Recently, while looking over some standard roses that are being forced in a peach house, I noticed some of the flower buds covered with ants, and thinking they were after aphis or some other insects, I examined the buds more closely, and, to my surprise, found that they were greedily eating away at the buds, and had already spoilt several of them by eating right into the buds, where, on examination under my pocket lens, some were busy eating, while others seemed to be sucking the juice out of the embryo petals. I immediately had pieces of old sponges soaked in paraffin and tied round the stems, which soon put a stop to their rosebud feast, and necessitated their setting off in search of fresh pastures. It is pretty well known that they eat the pistils out of peach flowers, but I was not aware till recently that the ant was an enemy to the rose also.—*H. Henderson, in Gardeners' Chronicle.*

HUTTINGER'S STOVEPIPE FASTENER.

The annexed engraving represents an improved fastening for stovepipes, recently patented by Mr. A. Huttinger, of Liverpool, O. The device consists of a hook lever pivoted on the side of the pipe to be fastened, near the end which enters the chimney or flue. A rod extends from the hook of the lever along a groove in the side of the pipe and through the pipe hole, and has an elbow or hook to engage with the chimney wall or other place with which the pipe is to connect.

The pipe is drawn up tightly by turning the hook lever,



HUTTINGER'S STOVEPIPE FASTENER.

and is retained by a pawl which engages notches in the back of the hook. It may also be retained by pins passing through holes in the rod, and in its guides. The hook of the lever acts as a cam by engaging the end of the rod.

This device is inexpensive, easily applied, and insures the firm support of the pipe.

Grindstones.

Grindstones are made from the more compact sandstones, varying in texture and compactness according to the work required. Those of England are highly esteemed. Different localities of that country afford such as are required for almost every purpose. Among these the "Newcastle" stones, from the coal measures of Northumberland and the adjacent counties, have a pre-eminence in England for general purposes; others are employed for grinding, while many varieties are used as plane surfaces for whetstones. Other qualities are used for hones. A German variety is famous for this purpose. The very finest qualities, composed of an almost impalpable agglutinated powder, are used as oil stones. Such are the "Water of Ayr" and "Blue" stones, and the "Turkey" oil stone. The old "Royal Exchange" of London was paved with this stone, and when it was burned, about 1834, the pavement yielded a handsome amount toward the re-erection.

The Nova Scotia and Berea, Ohio, grindstones are largely employed in this country; these may be obtained of very large size and uniform quality. The Washita, Arkansas, stone is of the very finest quality, being sharp and clean, and is made into a great variety of forms: grindstones, whetstones, hones, and slips of various sizes and forms.

In dressing rough grindstones the process of backing is employed. Hacking consists in notching the projecting parts with a short handled hammer resembling an adz. Laps used in polishing stones, etc., are jarred by holding an old knife against their edges, so as to vibrate or chatter, making a slight indentation at each jump; these serve to retain the finely powdered emery or rottenstone mixed with adhesive material, with which the lap is covered.

For clearing the surfaces of stones, in which particles of iron or steel have become embedded, a square bar of one-half to one-quarter inch iron is held and wabbled against the edge while in motion. This is called straggling or ragging.

Turning or roving is effected by reversing the motion of the stone and holding a hooked flat tool against its edge, which is afterward further smoothed by the roving plate.

The series of operations in making grindstones is about as follows:

The layer or ledge of rock being uncovered, channels are cut at each end of the slab to be removed, and then a row of holes is drilled on the line where the fracture is to be made. Steel wedges are driven into these holes, driving them consecutively a little at a time, keeping all on a strain, until the mass cleaves from the ledge forming a large parallelopiped. This block is similarly divided into squares, and these, if too thick, are split or cleft in the plane of the stratum to the thickness required. The square stone is now chipped into an octagonal shape, when it is ready to have the eye made. This is done by the pick hammer. It is then mounted on a mandrel driven at the rate of 125 revolutions a minute. The turning tools are five feet long, one and a half inches wide, and five-eighths of an inch thick, tapered to a point by the blacksmith, and afterward hammered to a hooked point by the workmen, who turn from one hundred to two hundred a day, according to size. An exhaust fan withdraws the stone dust, and a conductor leads it to the outside of the building. The stones are placed in a row, an iron rod and wooden axis through them, a wooden head at each end being jammed against the stone by nuts. Slats nailed to the wooden heads and hoops over the slats complete the package. The works at Berea, Ohio, are the largest in the United States.

The large grindstones employed in grinding gun barrels are eight feet in diameter, and are used until they are reduced to a diameter of about two feet, when they are rejected. They are placed in a case with holes for the introduction of the barrel, which is temporarily slipped upon a rod, a crank at one end of the latter enabling the barrel to be turned while the stone is rapidly revolved. The case keeps the water from splashing upon the workmen, and may afford some protection against pieces when the stone bursts, as it sometimes will, owing to the rapid rate at which it is driven. The danger of fracture cannot be entirely obviated, but may be much lessened by clamping the stone on its axis by disks instead of wedges inserted between the sides of the eye and the square arbor on which it is suspended. It would seem possible to avoid the eye altogether, and depend upon check pieces with studs or projections which penetrate into depressions in the sides of the stone. The stones are so heavy that their fracture when in rapid motion is apt to do great damage to life, limb, and property. Artificial stones are largely employed, especially in dry grinding and polishing.

The corundum stone used by the Hindoos and Chinese is composed of corundum powdered, 2 parts; lac resin, 1 part. The two are intimately mixed in an earthen vessel, kneaded, flattened, shaped, and polished. A hole for the axis is made by a heated copper rod. The grain is more or less fine according to the grade of the powdered corundum. The whole is mounted horizontally, and revolved by a bow in the right hand of the workman, while the left applies the work to the stone. The following recipe may also be employed: Sand of the required fineness, 3 or 4 parts; shellac, 1 part; melted, incorporated, and moulded under pressure.

Ransome's artificial stone, sand agglomerated by silicate of lime, has been used for grindstones with excellent effect.

In a test trial between Ransome's (English) artificial grindstones and some Newcastle grit, to ascertain which had the greatest abrasive effect, it was found that the Ransome stone ground away a quarter of an ounce from a steel bar three-quarter inch diameter in sixteen minutes, while a Newcastle stone (natural grit) driven at twenty per cent greater speed required eleven hours to effect the same work.

Stones for grinding cutlery vary in diameter from 4 inches to 2 feet. The faces of some, as of those for grinding razors, are convex. Those for dry grinding, an operation very detrimental to health, have a flue above, through which the small particles of stone and metal are driven by an air blast. The angles formed by the faces of the cutting tools increase in proportion to the hardness of the material to be operated upon. Thus, the razor has an angle of from 17° to 20°, wood cutting tools 25° to 45°, tools for iron and steel 60° to 70°. For reaming tools the angles are greater; for the hexagonal broach, 120°; octagonal, 135°.

Great care should be taken, where tools requiring an accurate edge are to be ground, to keep the face of the stone true. This may be effected by hanging a pair of grindstones so that their faces shall touch. Their rotation thus causes each to wear away the inequalities of the other.

The teeth of circular saws may be sharpened by a small grindstone having on the edge a ridge suited to the form of the teeth, and a slide fitted with an adjustable stop to regulate the abrasion.—*American Glassware Reporter.*