inventor June 28, 1881, No. 243,624; and it consists, first, in entirely inclosing both sides of the ditching wheel with suitable plates, to prevent the ingress of dirt into the wheel, and dishing said plates from the rim of the ditching wheel to its center, whereby the thickness of the ditching wheel is greatest at its rim, and the side plates will not interfere with the sides of the ditch in excavating it.

A novel device for dressing saw teeth has been patented by Mr. Edmund Holderman, of Liberty Mills, Ind. The object of this invention is to give uniform set to saw teeth after having been set and filed. The invention consists in a bar of metal having set screws and an adjustable guard for gauging the degree of set in saw teeth, and suitable clamping devices for holding a reversible file at any desired angle of inclination.

An improved cloth-cutting machine has been patented by Mr. Nathan B. Rafelson, of New York city. This invention consists in a press cutter frame provided with rollers which move upon a track along the sides of a table of any desired length and a combination of cutting blades, by which an entire pattern may be cut by a single operation. The invention further consists in an arrangement of spiral springs for preventing the cloth from being disarranged by the withdrawal of the knives

Mr. James H. Peters, of Nechesville, Texas, has patented an improvement in cloth-measuring reels, designed principally for measuring bagging, carpets, etc. The invention consists in the peculiar combination and arrangement of the cutting board with two standards, whereby the cutting board is made to act as a sufficient brace for the frame as well as to perform the offices of a cutting board.

Mr. John A. Quick, of Palestine, Texas, has patented a spring tensioned sash balance by which the top sash may be held in close contact with the top of the window frame or adjusted at a lowered position without hoisting the bottom sash.

HOW DWELLING HOUSES ARE POISONED.

A timely and important meeting of the New York Academy of Medicine was held the other evening to consider certain domestic causes of disease and death. The paper of the evening was by Mr. Charles F. Wingate, on "Practical Points in Plumbing," and the unsanitary condition of most city houses was discussed by Dr. Fordyce Barker, Dr. Willard Parker, Professor Doremus, and others. Introducing the essayist, Dr. Barker spoke at considerable length upon the very general prevalence of disease traceable to bad plumbing, and of the frequent loss of life in consequence of defective pipes and the absence of traps in sewer connections.

Mr. Wingate described some of the more common and disastrous defects in plumbing and the means for detecting and correcting them.

HOW AND WHERE TO LOOK FOR DEFECTIVE PLUMBING.

"The first point," he said, "is how to examine a house. Every part of the plumbing must be exposed to view or tested, and things are usually found different from what they have been represented. The peppermint test is one of the first. An ounce of oil of peppermint in a pail of water is poured into the openings of the plumbing fixtures at the upper part of the house. If the smell of peppermint escapes by a leak this shows that sewer gas would also escape. A second point is the quality of the details of the plumbing work. A single portion of the work, one joint of a pipe, will tell a practiced plumber the capacity of the workman. If a house is deficient in its minor details, it will be found generally bad. A direct leak from a pipe will be shown by holding a candle near it. The practiced nose can tell a leak in a short time, and by the density of the smell from a roof pipe it can be learned whether there is a trap in the pipe to the sewer. The sanitary engineer goes first to the cellar and looks at the sources of damp. These are manifold both in the city and country; rain and snow blow in; there is leakage from the water pipes and areas, and there is the refrigerator waste. I visited a house in Boston where all the rain water and refrigerator waste were soaking into the soil, and the house, in addition, was on low made-ground on the Back Bay. I saw here a novel phenomenon; the ground was so damp that the whole of the yard was covered with a fine moss. Dangerous as this dampness was, it was hard to convince the occupant, because there had been no sickness in the house, and the owner considered me an impostor.

"Another source of danger is from broken or leaky underground drains. Most houses have underground drains which are made of tiles laid by ignorant workmen, and I have seldom or never found a drain which was not in a defective condition. Even in Memphis the new drains were not absolutely tight, on account of the extra pitch in some cases, and of breaks. Then the soil becomes saturated with the worst kind of sewage. In Boston I have found many drain pipes without the proper pitch or flush. Some pitched toward the houses instead of the sewers; others were choked with grease, or there were no sewer connections at all. The plumber sometimes ran the drain over a rock, up and down, or ended it on one side, continuing on the other, or connected two sections of six-inch pipe by a four-inch pipe. A break or stoppage means such a deadly deposit of sewage as accumulated under a house I examined near Murray Hill. It was taken by a family last spring, who, in a few months, nearly all fell sick. The gentleman said that on opening the register in his bedroom he was almost choked by a peculiar ammoniacal smell. Nothing but iron pipes with lead joints properly coupled, and carried along the cellars in sight, or in trenches easily accessible, should be used."

SOURCES OF SEWAGE POISON.

After mentioning the risks arising from undrained made land and lands lying near the water level, Mr. Wingate traced the history of plumbing evils in New York city from the introduction of Croton water and the necessary development of the sewer system. In 1849 there were only 72 miles of sewers in New York; now there are 341 miles. Many of the first sewers were only sewers in name, having been laid to carry off kitchen waste alone. They were merely rough stone drains uncemented and open, so that when used to receive sewage they rapidly polluted the soil, and became simple store-houses of sewage. Down to a very late date many of the sewers of New York were constructed of inferior material and imperfectly laid. Badly burned bricks, bogus cement, and sand that was half loam were used in making them, while, especially under Ring rule, the contractors who laid them executed their work in the cheapest and most culpable manner. Few of the best sewers are really tight, while the majority leak at every joint, and thus the whole system is an enormous source of soil pollution.

HOW FOUL AIR PASSES THROUGH WALLS.

Mr. Wingate's paper was followed by a number of experimental illustrations of the permeability of brick and stone by these obtrusive and poisonous gases, and of the ease with which some gases pass through water. The experiments were made by Dr. Doremus, who said, "What must we do, if we have these gases in our sewers? If these are cut off from our houses by water traps, it does no good; the gases will pass through the water. We must have chemicals in the trap that will decompose the gases. Chlorine is the great agent, the 'ring breaker,' that will decompose hydrogen gas and every form of poison. Suppose there is a case of scarlet fever in a house, and the walls become impregnated with the poison. Chlorine or some other gas should be generated that will decompose the poison on the wall. In 1865 the ship Atlanta arrived at this port with a number of cholera patients. Sixty of her passengers had already died. At the request of the Health Physician of the city, and by the authority of Mayor Gunther and Dr. Swinburne, the Health Officer, the Atlanta and all other vessels entering the Narrows were treated with chlorine, bromine, and other active agents. This was so effective that not a single case of cholera occurred in New York or its vicinity.

"Dr. Agnew has informed me that about thirty years ago the north wing of the old New York Hospital became unfit for use in consequence of its walls having become saturated with disease through the reception of a large number of ship-fever patients. Ventilation was tried, but in vain. The walls were scraped, but many of the workmen sickened, and one at least died. At the Lincoln County Hospital, in England, the walls became magazines of disease in the same way. They were gutted and replastered, but it did no good. They then were treated according to the Hebraic system, and torn down to the very foundation. A few years ago certain wards in Bellevue Hospital were found impure, causing pyæmia. At the request of the Commissioners of Charity and Correction I attempted to purify them by the use of chlorine gas. I generated nearly three tons of this in these wards during many weeks. Every few months now the chlorine treatment, in a less vigorous form, is employed.

"Dr. James R. Wood stated, three years after the commencement of this treatment, that no case of pyæmia had originated in the wards since it had been adopted. I think we are warranted in saying that, owing to the porous character of all walls and the decomposing power of certain gases, we can purify not only the walls but the very stones of any edifice, if only the treatment is heroic."

Dr. Willard Parker recited the experience of the physicians at Bellevue Hospital when the ship fever prevailed in 1846. The death rate was fearful, yet the hospital became so crowded that many patients had to be treated in tents under the trees in the yard. Nearly all the unhoused patients recovered. Similarly, when a ship load of infected people were driven ashore at Perth Amboy, though nearly every case on shipboard resulted in death, not one of the sick exposed to the weather, under canvas shelters, failed to recover. It was a foul-air disease, and fresh air cured it. Dr. Parker added:

"We are living in the wrong kind of buildings, and everything is wrong. Previous to the introduction of Croton water in this city, I don't remember a single case of diphtheria. There were numerous cases of croup, and some which resembled diphtheria, now and then. It is a disease which depends on malaria, or bad air. It attacks families and goes through all the members. I had a friend, a physician, who depended on his cellar for all the air for his furnace. His six children were all stricken with this disease, and all of them died. And there are cases of that description everywhere. I say that if we have diphtheria, there is something wrong about our sewers. If I were to build a house, I would not have it connected in any way with a sewer. I should construct a sort of annex, where I should have all the sewers, closets, and all the pipes of the houses. I suppose most of you would object to having a vault filled with dead bodies a few yards from your house, and connected with it by a pipe. Yet this is practically what we do with our sewers. Water is no protection from them—from the germs of poison which generate and live in the foul air."

Pertinent remarks were also made by Drs. Vanderpoel and Janeway. Speaking of the portability of diphtheritic poison, the latter mentioned a remarkable case in his own practice. A child had died from diphtheria in a fine house in Brooklyn, and the parents with two others went South. At Pilatka, the trunks were unpacked, and there was taken out for a child a toy rabbit which the dead child had used for a plaything. In three days the child was taken with diphtheria, of which there were no other cases there, and in five days was dead; and the other child, a few weeks later, succumbed to the disease at a place in the interior of Florida where diphtheria had been unknown. The germs were conveyed by the rabbit and in clothing.

Engineers' Club of Philadelphia.

At the meeting, February 4, Mr. William A. Cooper presented a description of the progress in methods and contrivances for uniting the ends of rails—a subject of much thought among engineers, as the hundreds of patent fish-plates, chairs, nut locks, etc., show. From wooden rails spiked to sleepers embedded in the ground, an advance was made, about 1765, to iron straps nailed upon the wood to diminish wear. In 1767, at the Colebrookdale, England, Iron Works, cast iron rails 4 inches wide by 1¾ inches thick by 5 feet long, were laid. In 1789 cast iron rails are said to have been set and bolted in cast iron chairs fastened to sleepers, and, in England, the general method of wedging or bolting the rails to chairs fastened to the ties, has continued to be the general practice.

In early American railroading, the strap rail of "snake-head" celebrity was used for economical reasons, but soon abandoned for the T-rail. In 1847 the fish-plate or splice bar, which has superseded in this country all other means of fastening, was designed. It consisted of a pair of plates, 18 inches by 3 inches by three-quarters inch, bolted over joint by four bolts, two to each rail, with oval bolt holes to admit of expansion and contraction in the rail. A later improvement was the use of angle plates, giving greater support to rail and larger bearing surface, and admitting the spike slot in the plate, instead of the rail, to prevent creeping.

The secretary presented, on behalf of Mr. Howard Constable, a description of pneumatic pulverizer, which consists, in brief, of a chamber into which are introduced two injector nozzles, opposite each other, and each connected with a funnel for the reception of the material to be pulverized. By the expulsion of superheated steam through the injectors, the material, previously crushed to about the size of a pea, is forced into collision in the chamber, and about 95 per cent thereof is thereby reduced to fine dust and carried by the exhaust into a settling chamber, the tailings being collected in the bottom of the chamber and returned to the funnels. By a 20 horse boiler, 120 pounds pressure, 1¼ tons per hour have been pulverized, and it is expected to increase this to 2 tons per hour by a pressure of 200 pounds, and take the place of a 20 stamp mill which weighs about 4,000 pounds, while this machine proper weighs about 100 pounds only. Specimens of quartz, in crushed fragments and powder, were submitted—the latter being almost entirely composed of an impalpable dust. It is designed to make use of this machine for pulverization in general.

Action of Hydraulic Cements upon Embedded Metals.

John C. Trautwine, C.E., in a communication to the *Railroad Gazette*, dated Philadelphia, January 21, 1882, says:

"The fact that this important subject has of late been brought somewhat prominently before the notice of civil engineers and builders induces me to send you the results of ten years' trial by myself. The hydraulic cements used were English, Portland, and Louisville (Kentucky), besides which I tried plaster of Paris, both pure and mixed, with equal measures of the cements. All were of about the consistency of common mortar; and all were kept in an upper room during the ten years, unexposed to moisture other than that of the indoor atmosphere.

"The metals were partly embedded in the pastes and partly projecting from them. They consisted of cut iron nails (some of which were galvanized), smooth iron wire nails, brass in both sheet and wire, zinc in sheet, copper wire, and solid cylinders of lead, three-eighths inch diameter.

"The result at the end of ten years was that all the metals in both of the *neat* cements were *absolutely unchanged*; and the same was the case with those in the plaster of Paris, with the exception of the *ungalvanized* nails, which had become covered with a thin coat of rust: as were also those in the mixtures of plaster and cement, but to a less degree.

"This experience leads to the inference (already suggested by others) that moisture or dampness is the injurious agent in those cases of corrosion of iron and lead laid in cement that have lately appeared in the journals; and that if dampness can be absolutely excluded, both cement and lime mortar will probably protect from injury all the metals employed in ordinary constructions, for an indefinite time.

"Such entire exclusion of dampness may at times be somewhat difficult of attainment; for capillary attraction *alone* (unaided by hydrostatic pressure) will cause water to rise several inches in well-hardened cement; and it would be difficult to assign limits to its penetration when aided by a high head of water. Rain water is well known to percolate through many feet in depth of brickwork or masonry laid in lime mortar, even when it consists partly of cement."

How Aluminum is Obtained.

A mixture of ground aluminous clay (ordinary clay, but of a good quality) and soda ash (carbonate of sodium) are heated in a furnace, aluminate of soda and silico-aluminate of soda being formed. The fused mass is then broken into pieces and thrown into an iron tank containing water; the mass is frequently stirred, and finally allowed to settle.

The aluminate of soda (being soluble in water) is dissolved, while the silico-aluminate of soda (being insoluble in water) sinks to the bottom of the tank, with any peroxide of iron that may be present in the clay.

The liquid is then drawn off, and carbonic acid gas passed through the solution. This decomposes the aluminate of soda, forming carbonate of soda and pure alumina hydrate. Thus:

$$\underbrace{2AlNaO_2}_{\text{Aluminate of Soda.}} + \underbrace{CO_2}_{\text{Carbonic Acid Gas.}} + \underbrace{3H_2O}_{\text{Water.}} = \underbrace{Na_2CO_3}_{\text{Carbonate of Soda.}} + \underbrace{2Al(OH)_3}_{\text{Alumina Hydrate.}}$$

The alumina hydrate is then dried, mixed with chloride of sodium (common salt), and charcoal or coke, and formed into balls about the size of an orange. These balls are then taken and put into a vertical earthen retort and heated to redness; then a stream of chlorine gas is passed through them. The chlorine combines with the alumina (being greatly helped by the charcoal), and forms chloride of aluminum, which unites with the sodium chloride (common salt), and distills over or sublimes as double chloride of aluminum and sodium, thus:

$$\underbrace{Al_2O_3}_{\text{Alumina.}} + \underbrace{2NaCl}_{\text{Common Salt.}} + \underbrace{3C}_{\text{Coke.}} + \underbrace{3Cl_2}_{\text{Chlorine.}} = \underbrace{3CO}_{\text{Carbonic Oxide Gas.}} + \underbrace{2AlNaCl_4}_{\text{Double Chloride of Aluminum and Sodium.}}$$

Ten parts of the double chloride of aluminum and sodium thus formed is mixed with five parts of kryolite (a double fluoride of aluminum and sodium, found in Greenland), which serve as a flux, both in a state of fine powder, and to this mixture is added two parts of (metallic) sodium in small pieces.

The whole is now introduced on to the hearth of a reverberatory furnace, previously heated to the required degree, when a violent reaction ensues. The dampers are then closed, and all parts of the furnace kept as close as possible, to prevent access of air. This causes the mass to completely fuse. When the action has subsided and the decomposition is completed the furnace is tapped and the metal and slag are run into suitable moulds. Most of the aluminum collects in the bottom of the mould. Above this are two layers of slag, the top layer being sodium chloride (common salt), the middle layer being less fusible than the top, and consisting chiefly of fluoride of aluminum, in which small globules of aluminum are mechanically held, which are recovered by pulverization and sifting of the slag.

The following equation will show the reaction that takes place in the above reduction. Thus:

$$\underbrace{AlNaCl_4}_{\text{Double Chloride of Aluminum and Sodium.}} + \underbrace{AlNaF_3}_{\text{Kryolite, or Cryolite.}} + \underbrace{6Na}_{\text{Sodium.}} = \underbrace{2Al}_{\text{Aluminum.}} + \underbrace{4NaCl}_{\text{Common Salt.}} + \underbrace{4NaF}_{\text{Fluoride of Aluminum.}}$$

There are other methods, but this, says Mr. G. W. Gray, in *Knowledge*, gives the purest metal, and is one generally used in England and France. Messrs. J. Lowthian Bell & Co. (or Messrs. Bell Bros.), at Washington, near Newcastle-on-Tyne, manufactured aluminum on a large scale for several years, but gave it up a few years since, owing to it not paying so well as was first anticipated, and also on account of the limited demand for the metal. I think they used the above method.

Glucose from Cassava.

For some time past rumors have been current here of a company being in process of formation with a view of manufacturing glucose from cassava, but after careful inquiry, we have not been able to trace them to a reliable source. We have no hesitation, however, says the *Confectioners' Journal*, in saying that such a company is contemplated at an early day, and this fact adds interest to the plant which seems destined to take a prominent part in the development of the confectionery trade, and calls for more than a passing notice from us as to the nature of cassava, its *habitat* and its merits as a saccharine producing material. All confectioners know that glucose has become a very important article of commerce during the past few years, and the consumption of it has reached 200,000 tons in this country alone, and a large quantity is annually exported. It has been made heretofore from corn, which has advanced so much this year as to make this much-needed article quite expensive. The demand for it is very large and exceeds the supply. Heretofore the profits of manufacturing it have been very great at the rate paid for corn during the past few years. During the trial of a recent lawsuit in New York it came out in the evidence that the Buffalo Grape Sugar Company sold to one agency $100,000 worth of grape sugar, or glucose, per month. That company is now using nearly 6,000 bushels of corn every day in the week. A bushel of corn weighing fifty-six pounds will yield thirty pounds of sugar or glucose; the average net profit on a bushel of corn is between forty and fifty cents, since when the price has materially advanced. This would make the average profits of the Buffalo Grape Sugar Company over $1,000,000 a year, on a capital now invested of $4,000,000. The manufactured glucose is used chiefly for making table sirups, candies, for brewing purposes, as food for bees, and making artificial honey. It is estimated that 11,000,000 bushels of corn will be used this year by the various manufactories of this product in this country. The average production of corn in the States of Pennsylvania, New York, Ohio, Michigan, and Illinois is 35 bushels to the acre. The amount of glucose produced from one bushel is 30 pounds, or 1,050 pounds to the acre. Well authenticated evidence is at hand to the effect that 20 tons of cassava to the acre is no unusual crop in Florida. This would, at 56 pounds to the bushel, give a yield of over 700 bushels per acre, and, at the rate of 30 pounds of glucose per bushel, would produce over 21,000 pounds of glucose per acre. A comparison of the yield of glucose from corn and cassava from a large area is as follows: 1,000 acres of corn yields about 500 tons of glucose; 1,000 acres of cassava yields about 10,000 tons of glucose.

The method of cultivation is generally as follows: The ground is prepared as for planting corn, the seed (which consists of a section of the stalk containing an eye) is set in the sandy soil spaced about two feet, in rows three feet apart. When about eighteen inches high the field is cultivated in order to raise the soil about the base of the stalk, which affords a better support to the plant.

The leaves of the branching top shade the ground, and prevent the formation of weeds and evaporation of surface moisture. No irrigation is required, as the moisture is continually supplied to the tubers by capillary attraction. The tubers grow somewhat similar to the sweet potato, radiating from the base of the plant and lying generally horizontal. They may be utilized in about six months after planting, and will continue to grow without deterioration for a period of two years or upward, developing to such an extent that tubers weighing from sixty to eighty pounds have frequently been taken from the soil. The harvesting of the crop is very simple: The stalk is raised and tubers extracted by simply pulling them from the loose soil. The plant maybe again inserted, when it will produce new roots. The earth in this case is the storehouse from which the supply is extracted as required, with the advantage of the crop increasing in value as long as it remains therein, whereas in corn there is a season for harvesting, storing, handling, and rehandling before it comes to the hands of the manufacturer.

Cassava may be removed from the ground any day in the 365, and carried to the mill for direct treatment. For many years the root has been raised in Florida and used for many purposes. The plants are natives of South America. The roots (tubers) may be preserved for food purposes, by being simply cleaned, sliced, and dried; from such dried slices manioc or cassava meal, used for cassava bread, etc., is prepared by simply grating. The starch is separated and prepared for food under the name of Brazilian arrow-root, and this, when agglomerated together into pellets on hot plates, forms the tapioca of commerce.

The glucose made from cassava is of fine body and flavor.

NEW INVENTIONS.

An improved cuff or collar fastening has been patented by Mr. Mahlon Loomis, of Lynchburg, Va. This invention consists in a strip of metal bent at each end in opposite directions to form spring hooks, having the inner surfaces roughened or serrated and the curved portions corrugated.

An improved nose feed bag for animals has been patented by Mr. Charles J. Gustaveson, of Salt Lake City, Utah Ter. This nose bag has a supporter having two or more cross stays on the lower end for protecting the perforated bottom. The latter is made removable so that the device may be used as a muzzle.

An improved horse collar pad has been patented by Mr. Friderick F. Kanne, of Waterville, Minn. This improved pad can readily be applied to or removed from a collar; only the lugs of the arched frame rest on the horse's neck, and they are covered by a double thickness of leather. The pad will adapt itself to the neck of any horse, and the collar cannot become misplaced in its seat in the curved frame. There is an air chamber for the free circulation of air between the curved arched frame and the pad.

An improvement in end gates for wagons has been patented by Mr. Stephen D. Davis, of Malvern, Iowa. This invention relates to end gates for wagons, which are adapted to be let down to form boards or extensions to facilitate the use of a shovel in the removal of corn, potatoes, etc., with which the wagon may be loaded.

An improvement in that method of closing bottles and jars in which the stopper is made in two parts with holes through both parts that are closed by bringing these two parts together, has been patented by Mr. James D. Foster, of London, Ky. It consists in combining with the neck of a jar two circular disks of equal diameter having flat sides with holes through them, which holes are arranged out of registration, and one of which disks is forced down flat upon the other to close the holes in the same and form practically but a single stopper, and with which two disks is preferably combined a top coating of wax or cement.

Mr. Charles A. Kilpatrick, of Athens (Orcut Creek P. O.), Pa., has patented an improved adjustable instrument for planing and smoothing the edges of soles of boots and shoes. It consists in a handle with a bend or knee in the middle, and provided at this bend and on the under side with a curved knife and a gauge adjustable in the direction of the length of the handle. A sliding gauge, moving at right angles to the length of the handle, is held on the side of the same by a suitable screw.

An improved machine for spinning and reeling silk has been patented by Mr. Joseph E. Tynan, of Paterson, N. J. These improvements relate to machines for spinning and reeling silk. The usual process is to spin or twist two or more threads of unspun silk to form a single warp, which is afterward reeled into skeins by a separate machine. The object of the improvements is to perfect both the spinning and reeling mechanism, and further, to combine them in one machine, so that the operations can be successively performed without the time and labor required for spooling the silk after spinning.

An improved car coupling has been patented by Mr. Moses Robeson, of Galena, Kan. The object of this invention is to provide a car coupling by means of which two cars can be coupled together and uncoupled without running them together while the link is being adjusted, thereby avoiding danger to life and limb in coupling cars.

A New Sleep-Producing Agent.

According to the *Medical Record* Professor C. Binz, in a series of articles contributed to the *Berliner Klinische Wochenschrift*, announces the discovery of nerve-depressing and sleep-producing properties in ozone.

The accepted view regarding this gas has been that it is very easily decomposed, nascent oxygen being set free; that it is extremely irritating on this account to the tissues, acting much like chlorine, and that it cannot be absorbed by the blood. Binz, however, shows that, in proper quantities, it is not irritating, can be inhaled and absorbed, producing, as he claims, peculiar effects on the nervous system.

The gas was generated by the sparks of an electrical battery containing four of Bunsen's elements. The ozonized air was conducted by a tube through chloride of calcium. It was then carried by a tube either to a large air-tight glass bell, in which an animal was placed, or to a mask which was worn by the persons who inhaled it. Animals were first tried. If a strong and long-continued dose of the ozone was supplied, the usual symptoms of laryngeal and tracheal catarrh with strangulation and death occurred. If supplied in more diluted quantities for less than two hours, sleep or a lethargic condition was produced. Frogs, rabbits, and kittens, reacted best. The latter would, in the course of ten or fifteen minutes, become quiet and then lie down and apparently sleep. Shaking the jar would not arouse them. When removed and supplied with fresh air, however, they soon returned to their normal condition. Several animals were killed after having been in this condition, and no changes in the air passages or other tissues noted. Precautions were taken and experiments made to show that there was no carbonic acid poisoning and no introduction of nitrous oxide gas. The animals could, as a rule, be kept in the bell-jar for two hours before any symptoms of irritation appeared, even of the outer parts of the air passages.

The experiments were then tried upon human beings. Dr. Hugo Schultz was the first to submit himself. Subsequently five other gentlemen inhaled the gas. Three of them were put to sleep by it, the others were slightly stupefied or otherwise depressed. The time required for bringing on sleep varied between six and sixteen minutes. The sensations during this time were very agreeable. After removal of the gas the sleeper would awake within half a minute, generally sooner. It was suggested that in one quite susceptible person the condition was a hypnotic one, but inhalation in the same way of pure air produced no effect. After awaking there was some feeling of fatigue, but this soon passed away.

Large and prolonged doses of the gas produced sensations of nausea, dizziness, and strangling. But the diluted ozone was breathed for over half an hour without harm. Binz states that in too small amounts no effect is gotten; in too large ones, irritation is produced. He compares its action in this respect to that of alcohol when given. Prof. Binz claims no practical results from his discovery as it stands at present, but thinks that like every new scientific truth it may have eventually some useful bearing,

Coloring Metals.

Metallic objects may be colored by immersing them in a bath formed of 640 grains of lead acetate dissolved in 3,450 grains of water and warmed to from 38° to 90° Fah. This mixture gives a precipitate of lead in black flakes, and when the object is plunged into the bath the precipitate deposits on it. The color given depends on the thickness of the skin, and care should be taken to treat the object gradually, so as to get a uniform tint. Iron treated thus acquires a bluish aspect like steel; zinc, on the other hand, becomes brown. On using an equal quantity of sulphuric acid instead of lead acetate, and warming a little more than in the first case, common bronze may be colored red or green with a very durable skin. Imitations of marble are obtained by covering bronze objects, warmed to 100° Fah., with a solution of lead thickened with gum tragacanth, and afterward submitting them to the action of the above-mentioned precipitate of lead.

Do Bees Injure Grapes?

At the late annual meeting of the Northeastern Beekeepers' Association, the charge that bees injure grapes was discussed with some feeling. Two bills have been introduced in the California Legislature to forbid the keeping of bees because of the damage they are said to do to the ripening grapes. The northeastern beekeepers were unanimous in the opinion that honey bees never puncture the skin of the grape, though they frequent the vines to suck the juices of grapes already injured by birds or other insects. This it was claimed has been demonstrated by careful tests. Black ants are the chief mischief makers.